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The Condition of Track on the New York Central.

[WITH AN INSET.]

Several years have passed since we have published any of Mr. P. H. Dudley's remarkable records of the condition of railroad track, and meantime a steady improvement has been going on in permanent way on all railroads, and especially on the great ones. We take pleasure, therefore, in showing now the latest autographic records of the condition of the track of the New York Central. Each of the plates on the inset shows a division, and the three of them cover the main line from New York to Buffalo. In our issue of Aug. 3, p. 519, appeared extracts from the report to the Chief Engineer, which Mr. Dudley submitted along with these diagrams, and in that issue was a diagram showing the comparative condition of track from 1881 to 1899 inclusive. The reader will find it interesting to turn back to that number and see the change which has been made in 19 years.

Mr. Dudley is one of the most painstaking and ingenious of observers, and besides has been assiduous in his efforts to improve the design, composition and manufacture of rails. The observations that he has made and their records, combined with his studies and teachings in the special matter of rails, have done a great deal to raise the standard of railroad track in the United States. Speaking of the New York Central diagrams now shown, he says "the undulations in the track for 1899 are reduced to as low limits as each section and the conditions of the rails admit." The diagrams show a remarkable change from 1898 to 1899, even where the rail was not renewed between the two inspections. So much information is condensed on these diagrams that they are not easy to read, but a little study will make them clear. The method of constructing the lines is explained by Mr. Dudley, as below:

"As my track indicator runs over the road at 30 miles an hour, under the 6,500-lb. wheel loads and for the 11-ft. wheel base of the special 6-wheel truck, both rails are made to indicate autographically their own condition as to surface, due to the steel, ties, ballast, roadbed and labor. The car containing the indicator is 58 ft. long over all, and weighs 72,000 lbs.

"On the diagrams the 'Condition of Track Line' for each inspection represents the average sum of all the various undulations of the rails per mile, as mechanically summed up by the inspection apparatus into feet and inches per mile. To plot the sum of the undulations on the diagrams, the number of feet and inches per mile is reduced to inches and divided by 176—the number of 30-ft. rails per mile—which gives the average undulations per rail per mile in hundredths of an inch. Each horizontal line on the diagrams represents one-hundredth of an inch; therefore, as many lines above the base are taken as the average hundredths of an inch of undulation per rail per mile. The results for each mile are relative as to the Base Line, and can be compared with each other. The space between the vertical lines represents one mile of track. The average condition of each mile is indicated from the horizontal line crossed or touched by the 'Condition of Track Line' in the center of the space for the mile.

"Lines marked Age of Steel for each mile give its length of service, each horizontal line representing one year. Lines marked Percentage of Tangent and Curve show the approximate alignment of both tracks per mile. The percentage of tangent is marked on the left side of the space for the mile, and that of the curvature on the

right side. Each horizontal line represents 10 per cent. for the mile. Lines marked Profile show the gradients of the road, and are common to both tracks, though ascending grades on one track are descending upon the other and vice versa. Each horizontal line represents 10 ft. of elevation, and refers to the Base Line for track No. 1 in all cases.

"The Gage of Track is practically perfect as shown by the Condensed Diagrams. This important result is in part due to the fact that the broad, flat heads of the rail sections do not roll under the wheel treads. Lines marked Line—Alignment of the Rails, being 20, are also practically eliminated from the Condensed Diagrams."

The Mallet Articulated Compound Locomotive.

In a paper which appears in the *Revue Generale des Chemins de fer* for May, 1900, Mr. Mallet describes the progress which has been made in introducing that type of compound locomotive which bears his name.\* The record is of interest, both because of the considerable number of engines which are shown to be in use, and because of the evidence it presents that a type of engine which was originally intended for special service, is now gradually being employed under a greater variety of conditions. This is the more noticeable in view of the fact that its designer and promoter is not connected either with a railroad or a locomotive building establishment. While Mr. Mallet is conducting the business of a consulting engineer in Paris, the Mallet locomotives are being built in many parts of Europe, often, though not always, from his drawings and always under his patents.

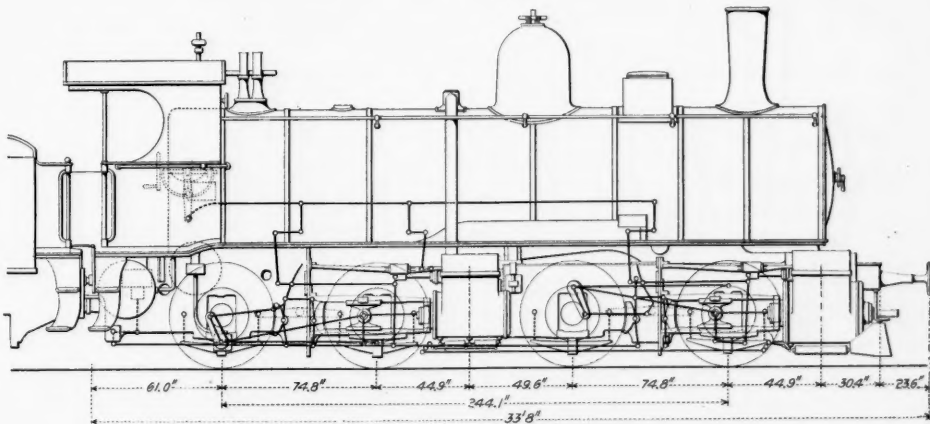
As is generally known, the Mallet compound locomotive is of the four-cylinder type. Ordinarily all of its wheels are drivers. These are arranged in two groups, each group consisting either of two or three pairs of wheels. The rear group is carried by the main frame of the engine and is driven by a pair of high pressure cylinders. The forward group is carried by a supplemental frame and is driven by a pair of low pressure cylinders; the frame and wheels of the low pressure engine constituting a truck by which the forward part of the locomotive is sup-

ported. The arrangement gives a total-adhesion engine, a long total wheel base, but a very short-ridged wheel base. It is especially adapted to slow heavy work on grades where sharp curves must be passed. The type was originally designed for narrow gage service, but as already intimated, many of standard gage are now in service. The illustration shows one of a lot of 28 standard-gage engines designed for the Central Railroad of Switzerland, one of which is now shown at Vincennes.

While this is to be classed with his heavy engines, it is not the heaviest of M. Mallet's machines. Its power may be judged from the following dimensions:

For the benefit of critics who have evidently argued that the fact that the two systems of engines entering into the make-up of the Mallet locomotive are not mechanically connected, is a defect in design; that because of it the locomotive has less adhesive power than a coupled engine with similar weight on drivers, M. Mallet quotes the performance of individual locomotives as reported by several European engineers of distinction, in evidence of good adhesion work accomplished by his locomotive. To the objection also, that his locomotive is complicated and expensive in repairs, he has an equally satisfactory response.

The conclusion of the paper is as follows: "The author believes that he should particularly insist on the fact that outside of the so-called current application which it has received, the system in question has given locomotives of exceptional power for broad as well as for narrow gaged roads, and by so doing it presents a practical solution to a delicate problem. The principle underlying this solution is to be found in the number of points re-



Mallet Articulated Compound Locomotive—Central Railroad of Switzerland.

ceiving support from the rails, a principle totally different from that which now controls in the United States.

Indeed, experience has not showed itself favorable to the coupling of more than four axles. American engineers have found nothing better than as they have felt the need, to increase the load upon each point of support, a load which tends soon to reach 25 tons. [Doubtless per axle, not per wheel.—Editor.] Generally speaking this is admissible for new roads where the track may be established at pleasure, but it is impossible if one may not or will not change the rails of an already existing line. In this case the first solution imposes itself, and there is no reason for being surprised if the Russian engineers have welcomed it with eagerness."

In his paper M. Mallet calls attention to the fact that his system is now represented by nearly 400 locomotives. The precise number is 395, of which number Germany has 119, Russia 107, France and her colonies 79, Switzerland 40, Austria-Hungary 10, Turkey 7, Sweden 6, and Spain 4; the remaining 23 being unclassified. They belong to more than 50 different companies of railroad administrations and represent an aggregate of more than 200,000 h.p.

In discussing the significance of these statements M. Mallet calls attention to the fact that while the articulated engine was originally designed for service on lines having curves of short radius, its designer had from the first more extensive plans. The purpose of the design was two-fold; first, to allow the construction of new lines possessing equal capacity but having curves of shorter radius and rails of lighter weight than those required by previously existing engines; and, secondly, to furnish, to existing lines, more powerful and more economical engines than those in hand, without increasing the load on individual wheels or the resistance of the

\* Locomotive Compound Articulée, Systeme Mallet, par M. A. Mallet.

Maintenance of Way.

Among the questions reported on for the International Railroad Congress at Paris is "systems adopted for the maintenance and renewal of permanent way on lines of heavy traffic, so as to avoid slackening speed of trains." The reports made for most of the countries of the world were given by abstract in our issue of July 13, page 479, and it would be well for the reader to look over that abstract before reading what follows.

Mr. J. W. Post, Engineer of the Netherlands State Railroads, reports on Austria-Hungary, Roumania, Holland, Luxemburg, Germany and Switzerland. He received answers to his list of questions from 22 different railroad administrations. The aggregate length of line which they reported on was 5,036, of which 2,694 is double track. The total length of track reported on is, therefore, 7,730 miles.

All of this railroad is laid with flange rails, with the exception of about 15 miles of double-head rail. The weight of rail varies from 60½ to 92¼ lbs. per yard; and the length varies from 21 ft. 7½ in. to 59 ft. ¾ in.



Nine of these railroads have some sections of line laid with metal cross sleeper; much the greater part, however, is on wooden sleepers.

The number of trains per day run over these lines varies from 19 to 60, on single track; and the speed of the fast trains is from 25 miles an hour to 56 miles an hour. In most of the countries reported on, the speed is limited by government or railroad regulations, the maximum allowable varying from 45 miles an hour to 56 miles an hour.

The routine observed in maintenance varies, as was found to be the case in the reports mentioned in our issue of July 13. On most of the lines there is local inspection in the spring, to repair local damages. On many of these lines a general revision, with continuous repair and overhauling, follows next, practically on the system of general revision so largely used in France. This general revision, however, is oftenest resorted to only once in two or three or four years. The local inspection is again made in the Autumn before frost sets in.

On most of the lines reporting, maintenance is carried on by the engineer department; only two of them let out to contractors the maintenance of certain sections, and these are sections of rather light traffic. Others of the administrations reporting had tried more or less the method of maintenance by contract, but had given it up because of the difficulty of making a schedule of prices, the difficulty of control and the inferior quality of contract work, and various other complications. One administration which lets out a part of its maintenance to contract says that the work done by its own men is superior to the contract work. Another, however, has somewhat recently employed a mixed system: From October to March the railroad gangs do the work, but from April to September special gangs are engaged which do work by the piece.

We find in this report, as in the earlier ones mentioned, a great diversity in the amount of labor required to keep up the track, which varies from 73 days' work per year per mile to 456 for single line; and from 73 to 765 for double track.

The practice as to renewal of ballast is naturally quite variable. Generally, it is renewed when it has lost its permeability. Sometimes the old ballast is removed and new laid down; or, otherwise, the old material is screened and mixed with new ballast. Rails are renewed when the head has worn down to a certain limit or when they have otherwise become unfit for service, as, for instance, flattening at the ends, worn by fish plates, etc. One administration has for the sake of uniformity adopted the rule of renewing rails entirely on any section where 20 per cent. must be renewed; and this same administration has adopted the practice of changing sleepers entirely as soon as 25 per cent. must be renewed. A good deal of importance seems to be attached by all of the reporting companies to having a homogeneous track, which cannot be the case where renewals are done in patches.

A good many details are given as to the organization of gangs and of work in renewal; as to whether or not traffic is entirely suspended on the portions under repair and as to the slackening of speed. It does not seem practicable, however, to generalize these details in any profitable way.

Mr. Post sums up his observations by saying that the roadbed should be well drained; that quality and depth of ballast greatly influence the cost of maintenance; that the original solidity of the permanent way reduces the work of maintenance; that the work of current maintenance does not as a rule call for any sensible reduction in speed of trains, and that total interruption of traffic can be resorted to only on double track. Where it is practicable to stop trains on the section under repair, the work is better done and quicker and cheaper.

### The Hatfield Collision.

The disastrous rear collision at Hatfield, Pa., Sept. 2 was reported in the *Railroad Gazette* of Sept. 7. The coroner's jury which investigated the case "recommends," "condemns" and "believes" in varying degrees. It strongly recommends the road to enforce the five-minute time interval; recommends the erection of Hall block signals (already in use on a part of this division); condemns Engineer John Davis for disregarding red flag and for running recklessly, and the conductor for permitting Davis to run too fast. The jurymen believe that operator Beidler at Souderton neglected his duty in not holding the special train, and "are of the opinion" that the Train Despatcher did not perform his duty; he failed to keep in continuous touch with these trains.

The *Philadelphia Press* in an editorial on the collision, says:

An appalling accident like that of the Reading shakes public confidence in railroad management. The roadbed has been improved until derailments are infrequent. . . . Rolling stock has been strengthened and inspection increased until accidents from a broken wheel or axle have almost disappeared. Collisions remain. The record as given by the *Railroad Gazette* has been as follows:

	1894.	1895.	1896.	1897.	1898.
Total accidents .....	1,500	1,487	1,357	1,358	2,228
Collisions .....	613	602	514	731	1,012
Rear .....	280	301	228	355	473

The proportion of collisions to derailments tends to increase. For rear-end collisions there is only one remedy—the absolute block and interlocking signals. Eight years ago, Oct. 10, 1892, the official announcement was made in our columns that automatic signals were to be introduced from Philadelphia to Bethlehem. If they were needed then they are needed now. In 1892 the

Reading's passenger traffic was 19,764,757, but was only 19,689,787 in 1898-9, and the road got \$254,293 less for carrying them. The gross earnings were \$22,986,248 in 1892 and \$22,456,192 in 1898-9, or \$530,056 less. This is, of course, the real difficulty with Reading. In eight years rates have fallen, competition has increased and receipts have not grown. But a single accident like that at Hatfield wipes out twice over the "accident fund" of \$224,744 set apart in its last report. . . . No one questions the honesty, good intention and faithfulness of the Reading management, but some precautions long delayed cannot be postponed longer without a risk which merits a harsher term than any one desires to use of a road envied by the difficulties of the Reading.

### Notes on Maintenance of Way Engineering.

#### Grades for Surfacing and Ballasting.

There is probably no other one thing in work of keeping up railroads where more extravagant errors are made or where more expensive economy is practiced than in keeping up surface of track. The writer knows of no text-book which gives any hint of how the engineering part of this work should be done. All of the books, save Putts', do give direction for setting grade stakes on construction and many a beginner, the writer among them, has taken the profile, got his elevation from a B. M. or from some bridge and then proceeded to set the stakes to the grade shown on the profile. The results are startling: the roadmaster probably ignores them, otherwise his appropriation would be exhausted with little accomplished, and the engineer has proved a poor investment.

Proceeding thus will restore the original grade, but it may cause large raising of the track on long embankments, and cutting down of grade in cuts, as in the former the bank has settled and in the latter the track may have been raised in the surfacing up. Unless this work reduces a grade it does not help. A good way to proceed in the matter of grades is to take the stretch of track where it is desired to fix grades, run a set of levels over it, taking care to have the stations exactly 100 ft. apart if there is any rise or fall to the grade, and then if the grades be of moment, fix a grade as if on any other survey, with thread or horsehair.

Some of the considerations in fixing the grade are these: It costs about four times as much per yard to remove material from under your ties as to put it under them. Hence, raise low spots rather than lower high ones. If you are using ballast other than earth, it is well to make your grades sufficiently high to allow the ballast to be worked under without digging out any material. This will be regulated by the size of the material of your ballast. It is seldom economy to make the raise less than 2-10 of a foot, but the question of the comparative prices of ballast material and labor are great factors in the question. I once worked out the raising of stretches of track half a tenth, one-tenth and two-tenths, using negro labor at \$1.12½ a day and a 60-mile haul of ballast, and found the two-tenths raise most economical. It was the smallest raise which would permit that particular ballast to be worked under the ties without sorting ballast, which takes time and your best men.

Some general rules should be followed regarding amounts of raise to be given in low spots. It is inadvisable if the general grade is a rise to use an adverse or even a level grade to avoid filling a sag. Each may be necessary, but only as a last resort. While to a considerable extent minor deviations in alignment are questions of sentiment, as every engineer desires that his central angle shall be recorded exactly as it exists, and that his tangents, length of curve, etc., be correctly recorded, and his curve be run exact, still as a matter of fact, if there be an error of 10° in his central angle and the curve is a 4° 05' curve in fact, instead of a 4° curve as recorded, it will not affect the wear and tear on the engines and rolling stock, nor appreciably the hauling capacity of the engine. On the other hand, if there be 10 ft. more rise in a grade than is shown, and the grade be + 0.9 instead of + 0.83, it affects the cost of moving every ton of freight going over the line. Hence more care should be exercised in bringing track to true grade than to a true alignment.

Also exercise more care in bringing to an economical gradient. Suppose the present grade as you find it is for 10 stations + 0.8 and for 5 stations + 1.0 and for the succeeding 5 stations + 1.4, when the recorded grade on profile is + 1.0 for the entire distance. If + 1.0 be the ruling grade of the division, this sag should be taken out at even a considerable expense, as it adds materially to the expense of hauling trains. It costs, say, \$1 per mile to haul a train over a 100 mile division, or \$100. Suppose the engines in use on the division can haul 22 cars over the + 1.0 and only 20 cars over the + 1.4 grade, it will in one case cost \$5 per car and the other \$4.55 per car to move freight. Two freight trains per day, which are loaded to maximum, for 350 days a year will make a very considerable saving in net earnings.

In railroad work few of us are given large sums of money to improve the roadbeds under our charge. Hence, it is our imperative duty to make liberal use of our level. Ten days' field work of a level party and two days' conscientious work over the profile of an engineer familiar with the ground, will often save 20 times their cost in work of section crews and extra gangs. One of the shrewdest contractors I ever knew, B. F. Johnston, of St. Elmo, Ill., once said to me that "An engineer could do more grading than 50 scraper teams." No man having seen the results of doubling the money spent on engineering will question his correctness. It is also true that an engineer party can often accomplish as much as

an extra gang of 50 men. That is, by spending sufficient time on the work, an engineer can so lay out the work that the extra gang will bring to surface as much track in 30 days as the same gang could have brought to surface in 60 days, where grades are merely bungled in. Let me impress on my reader the unwisdom of economizing the expenditure of his own time, and that of his party where there is a possibility of accomplishing some of the larger economies. I was once asked to put in operating shape 150 miles of badly run down road with a totally inadequate sum of money. By a series of make-shifts, filling in a few openings, utilizing the sound portions of the timber from these bridges, in renewing decayed parts of others, etc., I secured a fair sum for my track work. Having made liberal use of an engineer party and studied the profile carefully I was enabled to reduce my ruling gradient from 1.2 to 0.83, and by using ditches liberally to vastly improve my roadbed.

It is well to sacrifice considerable to avoid a choppy grade, but changes from a + 0.4 to + 0.6 and back to a + 0.3 and similar changes are not to disadvantage. The question of vertical curves is of much theoretical discussion and the writer has seen formulas covering eight stations each way from the apex and involving changes as small as 0.012 ft. He is disposed to believe that any change of less than 0.1 ft. a needless refinement, for the reason that no track man will keep track to such a surface. He suggests as the best and easiest of application that shown in Shunk's "Field Book," and that 200 ft. in each direction is usually, and 300 ft. always, sufficient apex distance. He would urge that they be always used, especially in sags where they are more important even than on summits.

TRANSIT.

### Patriotism and Business.

Following are two extracts from recent expressions of opinion on demand and supply in the electric traction equipment of railroads, as taken from different English technical papers. The candor of one is equalled only by the excitement of the other. While this interesting divergence of views is being reconciled American manufacturers will doubtless willingly continue to supply the present need, in order that no time may be lost:

First Voice.—"We are truly at a loss in what language to place before our readers an act so unpatriotic on the part of the local authorities of a British municipality, that we should refuse absolutely to believe it to have been committed had we not before us in black and white the fullest proof in the form of a document signed by the borough engineer of Southend-on-Sea. That the ratepayers of that town can be aware of the way in which their municipal officers are spending the rates is not credible, and we feel convinced that the truth will be a shock to them as great as it must be to every patriotic Englishman. At this very moment, when the technical, as well as the political, press of our country manfully endeavors to stir up our manufacturers to make a firm stand against foreign competition, and in this very hour of earnest effort to rally British producers the corporation of Southend-on-Sea throws into the lap of our American competitors the funds which have been entrusted to it by the community which it has the honor of representing. Southend-on-Sea is in want, it seems, of certain truck and car equipment for an electric trolley line, and only a few weeks ago visitors to the Agricultural Hall in London had an opportunity of seeing that such material is obtainable in our country, at reasonable prices, from industrial concerns that are exclusively British, and which spend the money they receive in our own country. The local authorities of Southend-on-Sea realized that, by the merest rules of decency, they were obliged to ask these firms for tenders. It is one of our best known engineering firms whom we have to thank for handing over to us the document that was sent to them. On page one of the specifications we read as follows: 'The equipment under this section must consist of the following apparatus and materials, inclusive of supply, delivery and fixing. Each car to be supplied with: Two Thomson-Houston G. E. 52 railway motors on ten double-deck cars; two Thomson-Houston G. E. 58 railway motors on two bogie cars, etc. Why any British firm, excepting the British Thomson-Houston Company, should be invited to furnish the above-named motors is an absolute mystery, for the choice of Thomson-Houston manufactures in preference to others has obviously been made beforehand. Since, however, there is a British Thomson-Houston Company in existence, our readers will perhaps say that the selection, although it indicates favoritism, is at least not necessarily unpatriotic. Granted so far; but let them read what follows on page two: 'The motors shall be of the General Electric of America's manufacture.' Here, then, we see that not the British Thomson-Houston Company is intended, but it is stated in so many words that no British makers need apply, not even such as are called British by courtesy, and that the goods must be of American manufacture. Again, on page three, for instance, we find, with reference to 'Controllers,' that these also 'are to be of the series parallel type of the General Electric of U. S. A.' On page five, with regard to 'Trucks,' occurs the following stipulation: 'The twelve four-wheel trucks shall be of Brill (21-E. type, with solid forged frame) or Peckham extension manufacture,' i. e., American, and 'the four bogie trucks are to be Brill or Peckham maximum traction trucks,' while 'the axles are to be of open-hearth steel of Pennsylvania Railroad standard, quality and test.' On the next page, finally, we read that 'four bogie Brill or Peckham maximum trucks are to be provided for,' and so on throughout the whole document. To make American manufacture, in a British municipal enterprise, a condition sine qua non, and to deprive British manufacturers of even a chance of competing, is an act on the part of the local authorities of Southend-on-Sea that the patriotic ratepayers of that town should chastise as a gross abuse of their confidence; but to send to British firms a copy of a document of this nature, under the pretext of inviting tenders, is an action that, in

the name of these firms, we feel it our duty to stigmatize as a disgrace for all those responsible for it. We most earnestly hope that never again shall we have occasion to bring to public notice a breach of loyalty to British interests so flagrant as that committed by the Corporation of Southend-on-Sea."

Second Voice.—"During the past few years it has been considered necessary for every English electrical engineer occupying a position of any special importance to become more or less Americanized. We cannot open a New York technical journal without finding that one or other of our electrical engineers has been on a brief visit to the States, in order to make himself acquainted with American ways and systems, and deduce therefrom the trend of electro-technical development. Many of these have gone as the representatives of our municipalities, seeking up-to-date knowledge regarding electric tramway practice, while others have been sent on behalf of electrical and tramway equipment manufacturers, anxious to, as far as possible, regulate the character of their future output by the probable requirements. In a few cases, also, engineering firms have sent representatives and sometimes principals have gone themselves, in order to become thoroughly acquainted with the ins and outs of American works management, to examine into machine tools and machine tool methods, and to place orders for similar tool equipments in substitution of old machines which have done comparatively inefficient service for some time. English engineering, and electrical engineering in particular, has been benefited by the reports made upon such investigations. To be enterprising too late in the day is tantamount to not being enterprising at all, and there may perpetually be a certain headway to make up if ever there is to be any approach to getting into line with others. We suppose that of recent years few facts have been so plainly evident as that English manufacturers needed to put forth a great effort to recover lost ground in electric traction machinery, both in regard to power station equipments and electric cars and other rolling stock."

### The Pennsylvania Class E-2 Locomotive.

A new class of passenger engine representing what is considered by the mechanical department of the Pennsylvania Railroad Company to approach close to the highest development of the locomotive builder's art, has just been turned out of the Juniata shops at Altoona. It is the class E-2 type, having four pairs of 80-in. drivers, and one pair of trailing wheels 50 in. in diam. On account of the unsatisfactory cab arrangement of the

of the heat from the steam dome. This arrangement looks very neat and reduces the number of humps on the top of the boiler.

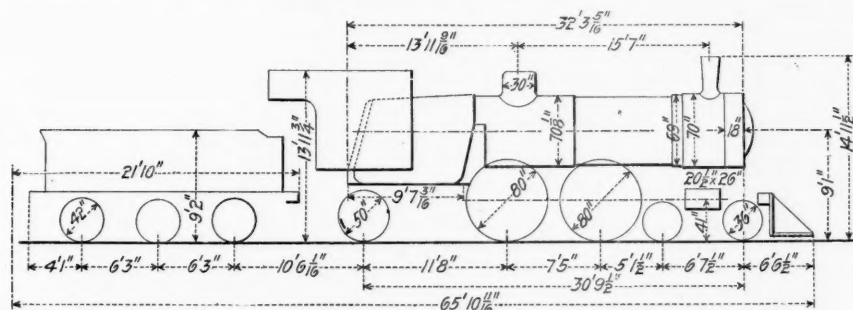
### International Specifications and Tests.

BY WM. R. WEBSTER.

At the Paris Congress, on the methods of testing materials of construction, Mr. Webster presented a long paper dealing with the matter of international specifications and methods of testing iron and steel as seen from the standpoint of an American engineer. Extracts from that paper are printed below. Those who wish to read it in full can find it in *Engineering* (London) Aug. 3 and 10.

Although this Congress does not propose to adopt general resolutions on subjects presented, it is hoped that it will, nevertheless, through its papers and discussions, bring about results of lasting benefit to the manufacturers and users of steel in all countries. . . . The work should be regarded as that of cleaning house, in the sense of getting rid of a lot of old rubbish in our present specifications and rule-of-thumb methods of working. After this preliminary work has been done it will be possible to draw up specifications that will be reasonable and just, both to the manufacturer and to the consumer. . . . Formerly the manufacturers avoided discussing methods of manufacture and chemical composition of steel as affecting the character of the finished material, claiming "that it was none of the engineer's business as long as the tests of the finished materials gave satisfactory results." They also advocated leaving out the chemical requirements altogether. But the day for this is past and the manufacturers are now ready to discuss freely with the engineers and investigators all points that have any bearing on their materials, methods of working, or specifications, and all parties will be well repaid for an exchange of ideas on these broad lines.

. . . Now that the International Association has taken up the matter of International Specifications, our manufacturers are deeply interested, and are co-operating in every way possible. It would be a decided step backward to give up the chemical requirements in our specifications, as we are learning more of their true value every year. Again,



Pennsylvania Class E-2 Locomotive.

class E-1 engine, particular attention has been given to the comfort and convenience of the engineman and fireman. Steel has been largely used in the construction, and this material is found in the wheels, cross-heads, pistons and other important parts. The boiler is of the Belpaire, wide fire-box type, with a slanting back head on the fire-box.

The following are some of the dimensions:

Boiler pressure, lbs. per sq. in.	185
Size of cylinder	20 in. x 26 in.
Exhaust ports	3 in. x 20 in.
Steam ports	1 1/2 in. x 20 in.
Outside lap of valve	1 1/2 in.
Travel of valve	1 1/2 in.
Total heating surface, sq. ft.	2,278
Ratio of heating surface of flues to heating surface of fire-box	15 : 4
Ratio of heating surface to grate area	48 : 1
Number of flues	230
Length of flues	15 ft.
Total heating surface 1 flue, sq. in.	1,131

The tractive power of the engine with a m. e. p. of 80 per cent. boiler pressure by the usual formula is 20,220 lbs.

The first engine of this type, No. 269, was turned out of the Juniata shop about four weeks ago, and some trial runs were made on trains Nos. 21 and 8 on the Pittsburgh Division between Altoona and Pittsburgh, and the performance of the machine was very satisfactory to the officers directly connected with the mechanical department.

The engine is now in service hauling high-speed express trains between Camden and Atlantic City on the West Jersey & Seashore, and while there are a few features about it which may not impress one as desirable at first sight, the machine looks extremely plain but attractive withal, and is likely to make some phenomenal speeds after being thoroughly broken in.

There are three conspicuous features about this engine, short extended smoke-box, main driving wheels removed from under the fire-box, and the longer flue. Some new features have been introduced in the spring rigging which is reported as causing the engine to ride very smoothly on tracks in the ordinary condition, but with perfect ease on the roadbed of the West Jersey & Seashore, which is the nearest approach to perfection which can be produced.

The usual sand-box on top of the boiler is made up around the steam dome, which keeps the sand quite dry and at the same time the sand prevents rapid radiation

the engineer does not test each piece of material, but from tests of a part accepts the whole. Now if the results of such tests are to be relied on, we should start with a steel of uniform chemical composition, and use uniform methods of heating, rolling or forging to produce uniform results in the finished steel. This is better known to-day than ever before. In deciding on the chemical limits, advantage should be taken of the results of recent scientific investigations and also of the practical experiments of the manufacturers. The limits should be broad enough not to impose unreasonable hardship on the steel maker, but narrow enough to constitute an additional check on the physical tests of the steel. Due consideration, of course, should be given to the size of the finished section into which the material is to be rolled, forged or cast, and also to any subsequent annealing or other treatment it is to receive. . . .

Everything goes to show that the true starting point in the work before us is the relation of the chemical elements in the steel to its physical properties, in connection with different conditions of heat-treatment and mechanical work. As yet we have very little data showing how the changes due to heat are modified by mechanical work. This is the most important present field of research. Many objections were formerly made to this method of grading steel by its chemical composition, and even now, when it is in practical every day use, you still hear reasons given why it cannot be relied on, notwithstanding all the facts to the contrary. The whole matter reduced to its simplest form is this: Suppose the records of a given works show that a heat of steel of a given composition rolled into material one-half inch thick gave 65,000 lbs. ultimate strength with good stretch and good bends; now having at the same works another heat of steel of the same chemical composition, and requiring more of the half-inch material of 65,000 lbs. ultimate strength, this second heat of steel, if treated in rolling the same as the first, should give the same results. Almost anyone will agree to this, but, of course, you cannot rely on getting heats of steel of the same chemical composition as those formerly rolled, and even if so, you might have to roll them into material of different thickness. It therefore becomes necessary to interpolate for the differences by giving each element a value in pounds per square inch for each .01 per cent., and also to make

allowances for the thickness of material to be rolled. If our observations were large enough, and records could be put in shape for easy reference, there would be no need of this interpolation, but it is impossible to cover all cases in any other way. . . .

In my work I found the first thing to investigate was the relations of the physical properties of steel from the same melt when rolled into material of different thicknesses, and also the results of same thickness of material when rolled under different conditions of finishing temperature, etc. This led to many interesting experiments and showed the difficulties of controlling the amount of reductions in rolling and the finishing-temperature. The men working by the ton naturally concentrate their efforts on a large output irrespective of any refinements in rolling. It was not an uncommon thing for the rollers to bring out what they termed the second heat in rolling. They could tell by the first pass or two the condition of the bloom, and if it was well heated and soft they would then take as heavy reductions in the next passes as possible, in fact almost stall the universal mill. This excessive amount of work in large reductions made the slab on the surface hotter than in the first passes, considerable heat being generated by the work and the hot metal being reduced and elongated quickly, bringing the hot interior up nearer to the surface without the usual time for it to cool down. Steel so treated was always injured, and it made no difference what temperature it was finished at, it never was as good as when rolled with small reductions from the start. This trouble was in no way caused by overheating the slab in the furnace to start with, as two slabs of same dimensions taken from the same furnace could be made to give different results, depending on treatment in rolling, even when the final finishing-temperature and thickness of material were the same. This matter has not received the attention it deserves, as it may account for some of the differences in the behavior of steel that have not been explained by chemical composition, and total reduction received in rolling, or the finishing-temperature. The old statement that "all work in rolling steel at high temperatures merely changes its form without changing its structure," will have to be modified if the second heat is brought out, for it certainly does more than change the form of the mass.

As the size of the piece of steel rolled is increased, the trouble of controlling the finishing-temperature also increases, as the large mass holds much more internal heat, and steel of the very best chemical composition may be rendered brittle and worthless (in that condition) by being finished at too high a temperature. This trouble is again increased by trying to roll heavy sections on a light mill, but the worst of all to contend with is a heavy section of high carbon steel on a light mill. . . .

All are familiar with the changes that take place in the physical properties of steel, and the large, coarse grain that is formed when it is heated up to a high temperature and allowed to cool without work. . . .

In the application of all this, it makes no difference whether the steel changes from the fine to the coarse grain while the temperature is rising, or whether this change takes place, as Mr. Sauver claims, while it is cooling. I am as anxious as anyone to know when the change does take place and all about it, but the matter of vital importance is to work steel in such manner that it is not put in service with this coarse grain. . . . In order to secure the best structures it is just as necessary to take up shop methods with the same thoroughness as methods of testing and specifications. If this is done, we shall not hear any more of the so-called "mysterious failures of steel."

In my present work as a Consulting and Inspecting Engineer, representing the users of steel, both at home and abroad, I have found many specifications in which the chemical and the physical requirements conflict. . . .

In order to bring out some of these points for discussion, I will refer to matters found in the specifications, methods of manufacture, and methods of testing in use to-day. The discussion itself will doubtless bring out many more, of equal importance. Methods of testing will not receive in these remarks the prominence they deserve, since they will be fully covered by other contributions.

1. In the manufacture of heavy plates, there are chances of trouble, through their being finished, in rolling, at too high a temperature. It is not an uncommon matter to try to get such plates accepted on the results of tests made on thinner plates rolled from the same heat of steel; or, when heavy plates are tested, allowances are made on the per cent. of elongation and degree of bending. The better plan would be, no doubt, to anneal all extra-heavy plates and take no chances whatever, but the annealing should not be done as directed in a specification sent me some time ago, which stated: "All material must be annealed from the heat of rolling before it has time to cool." Now this is not annealing at all, it is only slow cooling, and it will make a plate or other heavy section that has been finished at too high a temperature worse than it otherwise would be, as the size of the grain is increased and the steel is made more brittle. Too much importance cannot be given to this matter, as much steel has been treated in this manner in the mills and shops in rolling, forging, flanging, etc. In this connection the recent investigations on the heat-treatment of steel have shown the importance of allowing the material to cool down before it is heated up for annealing, but this important information has not been brought clearly before the manufacturers and shop foremen. . . .

2. Should axles, tires, forgings and castings be annealed or not? It is claimed, that when material is to be



annealed there is a tendency on the part of the manufacturer to use an inferior steel that will be improved enough by annealing to meet the physical tests. This is only another plea for specifying proper chemical limits, for when these are stated, the question is narrowed down to results that will be obtained in service from good steel, both without annealing and after annealing.

3. Quench-bends are commonly specified and considered an important check on the quality of the steel, but they never should be relied on, unless cold bends are made on the same material, for the following reasons: A piece of mild steel that has been injured by being finished in rolling at too high a temperature will not give good results in cold-bending tests, yet when another piece of the same steel is heated up and quenched in water, it will then bend down flat. The cold bend would condemn it, while the quench-bend would pass it. This is due to the fact that in heating, the material for quenching the coarse crystalline structure is changed by annealing, and on quenching there is not enough carbon present to harden it. This seems so self-evident that one wonders that the cold bend has even been omitted, yet such is the case, and inferior materials have been accepted on quenched bends.

4. The tendency is to insist on test-pieces with a gage length of 8 in., and, in some cases, in order to obtain them, methods are used that are anything but satisfactory. For instance, in large forgings a prolongation is hammered down to 1½ or 2 in. sq., in another case, after a tire is tested under the drop, a piece is cut out and then heated in order to straighten it, so that the long test-piece can be obtained. In each of these cases the materials tested will not represent the steel as put in use, and test-pieces with a 2-in. gage length could have been obtained that would have given reliable information of the steel as put in service. These short test-pieces have much to recommend them in cases of this kind, and are often specified. No doubt, they will be universal some day. But for plates, bars and shapes the longer test-piece is better, and most of our records are based on it.

5. In ordinary practice an allowance is made in estimating the per cent. of elongation on plates of different thicknesses, by taking a gage length of 8 in. for medium thickness, and shorter gage lengths for thicker and thinner plates. This tends to keep the apparent per cent. of elongation the same. It is a better plan to specify the elongation in 8 in. in all cases, and make reduction in percentage for heavier and lighter plates.

6. The per cent. of reduction of area is generally called for, and relied on by many as one of the best indications of the quality of the steel. This may be all right when round test-pieces are used, but with the ordinary rectangular test-pieces of different widths and thicknesses, with their square corners, the results do not always show the value of the material.

7. Formerly an elastic limit of one-half the ultimate strength was standard practice, but now in many cases much higher results are called for. This has come about by the careless methods used in the rush of work, giving results that are too high.

8. In some cases, in specifying the ultimate strength, the lower limit only is given, reliance being placed on the other requirements of elongation, reduction of area and bends, to prevent too hard a steel being used. But there are chances of wide variations in the ultimate strength, even when great care has been used in fixing the other requirements as a check; and it is a much better plan to name both the high and low limits in all cases, making the differences between these limits to correspond with what can reasonably be expected from the best practice on the different grades of steel. In this way the practical difficulties encountered in rolling the high-carbon steel can be recognized and provided for in a proper manner, but not by omitting the upper limit in the specification.

In all of this work we cannot overlook the practical difficulties the manufacturers have to contend with, and the best way to show our appreciation of the good work they have already done, and to encourage them to new efforts, is to leave out all hair-splitting requirements in our specifications and methods of testing.

#### STEEL RAILS.

The usual practice in this country, on steel rails, is to specify the chemical requirements and drop-tests. But in foreign specifications it is not unusual to find bending-tests, deflection tests, drop tests, tension tests cut from the head, and tension tests cut from the web. All of these tests are certainly not necessary, and the tension test is one that is almost impossible to comply with and keep up with the output of the mills, on account of the delay in preparing specimens and making tests. These tests can certainly not be made on each heat of steel, and slight differences in finishing-temperature will give wide differences in tensile strength. Furthermore it is an open question whether the results of such tests show the value of the rail as a whole. The drop-test is the most satisfactory of all these tests, and can be made on a short piece of rail from each heat of steel, without delaying the mills in any way. The result of these drop-tests, when taken in connection with the proper chemical requirements, are a sufficient and reliable check on the quality of the steel, as well as the rail itself. It is, no doubt, safe to assume that the total amount of reduction from ingot to rail in our modern mills is sufficient, for if much larger ingots are used there will be trouble from segregation, and brittle rails result from part of the ingot, unless the greatest precautions are taken as to the amount of discard.

The ordinary flanged rail is one of the hardest of all sections to roll, owing to the large mass of metal in the head holding the heat much longer than the thin metal in the web and flanges. . . . This difficulty is further increased by using a higher carbon steel in heavier rails, which requires a lower finishing-temperature in rolling than the lower carbon steel in the lighter rails. But instead of this we have the higher carbon heavy rails finished at a higher heat, which, as a matter of course, gives a much larger grain in the head of the rail than that in the head of the light rails. Many suggestions have been made to overcome this difficulty, but it still exists. A thorough investigation may show that with the heaviest rails more metal in the flange and web would be advantageous, not for additional strength, but to carry the heat. . . . The beneficial effects of finishing a heavy rail at the proper temperature in rolling is shown in re-rolling heavy rails that have not given good service in use, but after this second rolling they have given satisfactory results. This is accounted for in the first place by the annealing action of the furnace in heating the rails up to a low heat for rolling, the coarse grain being removed in this way, and they are not heated up high enough to form it again. Then the final work of rolling on the head is at a low temperature, as the flange is in a condition to allow this work at proper temperature.

Cases have been cited where good rails chemically have given poor results, and where poor rails chemically have given good results; also where rails of low carbon steel have given better wear than those of higher carbon steel. These differences might have been, and probably were, produced by differences in the heat-treatment of the rails, and the conflicting results are the strongest plea for paying the closest attention to what may seem to many, small matters in the rolling and manufacture of steel rails. The problem must be considered as a whole; that is, the composition of the steel, its manufacture, heat-treatment, and the section of the rail.

As a general thing railroad companies have not enough data at the present time to assist the mills in duplicating an order of rails that have given the best results. They, of course, in a general way, know how the rails were made, but they have not this information in detail. . . . I want to call attention to the valuable information that can be arrived at from the very simple and inexpensive drop-tests on short pieces of rail. These tests are one of the best checks that we have on the finishing-temperature of steel. . . . They should be made on small pieces of rail (some with head up and some with head down) placed on solid supports. If the steel is of the right composition to start with, and proper care is used in its manufacture, a uniform rail will be produced if proper reductions and a uniformly low finishing-temperature are used. It is this finishing-temperature that can be best checked by the drop-tests; and some of our rail-makers think so much of this test that they make it on each heat of steel for their own guidance, while other manufacturers do not make any more of these tests than they can avoid.

I have endeavored to make a strong plea for retaining the chemical requirements in our specifications for rails, and bringing them up to date in all respects. To do otherwise would be to admit that we know nothing of the problem, that past experience amounts to nothing, and that we are willing to continue groping in the dark at the very time we are beginning to get light on some of the matters that have been bothering us. There are many other reasons why chemical requirements should be retained. They compel the steel-maker to pay the closest attention to his methods of manufacture, and the resultant steel is more uniform than it otherwise would be. But on this, as on most subjects, there is a difference of opinion, and Mr. C. P. Sandberg said at the Stockholm meeting of the Iron and Steel Institute: "The Railway Congress in Paris, in 1889, demanded rather hard steel rail, but the Congress in London, in 1895, would not sanction it. I trust that at the coming Congress in Paris, in 1900, engineers will leave out the chemical composition in their specifications altogether, and only demand an adequate tup test for safety, as well as a limited deflection to secure the required hardness, leaving out the tensile tests altogether. These latter are entirely out of place for rails, which are subjected in use to blow or impact, besides, tensile tests are both slow and costly for the preparation of test-pieces."

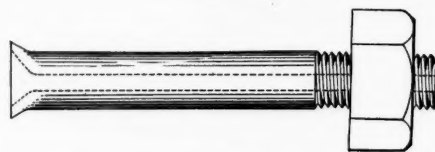
I trust that this Congress will not advocate leaving out the chemical requirements in our rail specifications, just as we are beginning to learn something of their value. What is really needed is more light on the effects of the different chemical elements on the finished rails, and I am firmly convinced that in the end the general decision will favor steel of fixed chemical composition for different weights of rails that, in connection with proper amount of mechanical work and proper finishing-temperature, will make the toughest, safest, and best-wearing rails. . . . But gradually the importance of the heat-treatment of the steel was recognized, and to-day it is safe to say that the heat-treatment of steel in connection with mechanical work is of nearly as much importance as the chemical composition of the metal. In considering the effects of one, it does not do to overlook those due to the other, but both should be kept before us, as so much depends on each.

Anyone who has had the specifications of one country to enforce at the mills and shops of another will admit the great advantage international specifications and methods of testing would be to all. In trying to bring this about, the commercial side of the question must not be overlooked, as it may be asking too much of engineers to give up the specifications that have been prepared for

their clients, and which have given satisfactory results for years. But no engineer would object to modifying his specifications so as to have them conform to the best practice and methods of working in other countries, unless he has decided to get his materials in one market only.

#### Hollow Anchor Bolts for Masonry.

Mr. L. K. Sherman, Lockport, Ill., an engineer who has superintended the erection of the regulating works of the Chicago Drainage Canal, has taken out patents for a new design of anchor bolt, to be used in fastening iron work to masonry. The accompanying sketch shows this



Sherman's Hollow Anchor Bolt.

bolt, 300 of which were used in the regulating works at the end of the Chicago Canal.

It will be seen that the bolt is hollow. Holes are drilled in the masonry the same as for ordinary anchor bolts and then the hollow bolts are attached to the iron work which is lined up to final position. The edges of the iron work joining the masonry surface being pointed with stiff mortar, a thick grout of neat Portland cement is forced through the bolt by a hand pump. In this way the iron work can be set in the final position before the anchor bolts are cemented, while no play is required in the bolt holes of the iron work. This latter feature is especially valuable where shearing forces are to be opposed.

It is thought these hollow anchor bolts will be found superior to solid bolts for bridge and turntable foundations, sluice gates, guides, turbine penstocks and other hydraulic construction. The holding power of hollow bolts computed for tension at 15,000 lbs. per sq. in. of net section for iron and at 200 to 250 lbs. per sq. in. of imbedded bolt surface is as follows:

Diameter.	Length.	Holding Power.
Bolt.	8 in.	3,480 lbs.
0.84 in.	12 in.	7,050 lbs.
1 in.	14 in.	8,700 lbs.
1¼ in.	16 in.	10,950 lbs.
1½ in.	18 in.	12,000 lbs.
1¾ in.	20 in.	18,600 lbs.

#### Improvements on the New York Central.

Elsewhere in this issue is published some account of the present condition of the track of the New York Central R. R., and still another article gives results of operation of the road as drawn from the annual report just issued. In that report, in a discussion of the items of maintenance of way and structures as appearing in the operating expenses, are the following remarks, which give information as to the policy of the company:

The expenses of maintenance of way and structures increased \$2,218,509.04, or 44.6 per cent. The expense per mile of road was \$2,580 and per mile of main tracks (sidings excluded) \$1,663. "Repairs of roadway" increased \$670,228.02. This account includes the cost of 465,639 cu. yds. of gravel ballast and 112,014 cu. yds. of stone ballast, with which 579 miles of track have been thoroughly re-ballasted. There were also constructed 84.62 miles of new sidings, the cost of which, together with that of extensive improvements in drainage, filling trestles, widening cuts, clearing rock cuts and tunnels, etc., appears in this account. "Renewals of ties," aggregating \$770,220.30, includes the cost of laying 1,615,927 ties, as compared with 1,389,206 in the preceding fiscal year. The substitution of cedar ties and tie plates on branch lines has progressed rapidly, 428,038 ties of this nature having been laid during the year, as against 183,798 in 1898-9. The number of ties laid per mile of all tracks was 270 as compared with 233 in the previous fiscal period.

"Renewals of bridges and culverts" increased \$738,756.70, or 150 per cent. This account includes charges of \$870,000 on account of the anticipated cost of the strengthening and rebuilding of bridges on the main tracks. This work was commenced in the spring of 1899 and will be carried on for several years. The approximate aggregate cost will be \$5,000,000, of which \$1,000,000 has already been absorbed in operating expenses, and \$2,000,000 more by the special improvement fund. The plan contemplates radical replacements of old structures, whether of steel or other material, with new steel bridges of the most modern type and of strength sufficient to allow the unrestricted use of the heaviest classes of engines and cars. In addition to the company's share of the cost of rebuilding the Hudson River passenger bridge at Albany, this account includes the expense of replacing 132 bridges weighing about 27,000 tons, and having a total length per single roadway of 34,670 ft. It also covers the cost of putting in 292 cast-iron pipe culverts weighing 609 tons; extensive excavation work for foundations; 12,871 cu. yds. of concrete in and above foundations; 8,219 cu. yds. of masonry, and the construction of 55 new sub-structures of various kinds. During the year 352 track openings have been abolished, as compared with 263 in 1898-9.

"Repairs and renewals of buildings and fixtures" increased \$535,437.94. Included in this account will be



found the cost of new coaling trestles or mechanical coaling plants at St. Johnsville, East Buffalo, Watertown, Weehawken, New Durham, Kingston, Ravena and Utica; also the expense of an entirely new engine house, with important yard improvements, at Ravena; the addition of water troughs at various places; water tanks, pump houses, pipe lines, etc. The block signal system has been kept in a high state of efficiency, and new towers have been added, involving an expenditure of \$98,993.01 more than in the previous year, an increase of over 100 per cent., all of which has been charged in this account.

### Train Accidents in the United States in July.

#### COLLISIONS.

##### Rear.

7th, at Fort McPherson, Ga., collision between a passenger train of the Central of Georgia and a freight of the Atlanta & West Point. Two trainmen were injured. It is said that a telegraph operator neglected to hold the passenger train.

12th, on Delaware, Lackawanna & Western, near Cresco, Pa., a freight train, consisting of 40 loaded cars, became uncontrollable on a descending grade and ran into another freight train, making a bad wreck. The engine-man and three tramps were killed and one brakeman was injured.

15th, on Illinois Central, near Tara, Ia., a passenger train ran into the rear of a preceding gravel train, and the conductor of the latter was injured.

17th, 10 p. m., on New York & Long Branch, near Red Bank, N. J., a passenger train collided with two freight cars which had run from a siding to the main track, and the engine and freight cars were wrecked. Three passengers and one trainman were injured.

18th, on Oregon Railroad & Navigation Co.'s line, at Cayuse, Ore., a passenger train ran into an empty engine standing on the main track and pushed it forward a short distance into the rear of a preceding freight train, wrecking both engines, the caboose and three freight cars. Three trainmen were injured.

19th, on Brooklyn Union Elevated road, at Fifth avenue and Fulton street, Brooklyn, N. Y., a passenger train which was stopped by the failure of its electric motor, was run into at the rear by a following passenger train of the Long Island road, damaging several cars. One of the trainmen of the standing train, who was examining the motor beneath a car, was crushed to death.

22nd, on Delaware, Lackawanna & Western, at Moscow, Pa., a freight train ran into the rear of a preceding freight, wrecking the engine and a dozen cars, many of which fell down a bank. Three trainmen were injured.

25th, on Philadelphia & Reading, at Girardville, Pa., rear collision of freight trains; one of the firemen fatally injured.

27th, on Delaware, Lackawanna & Western, near Bridgeville, N. J., a freight train descending a grade broke in two and the rear portion afterward ran into the forward one, making a bad wreck. Three trainmen were injured.

31st, at Woodlawn, Ala., a freight train of the Southern Railway was run into at the rear by a freight of the Central of Georgia; three trainmen injured.

And 12 others on 11 roads, involving 4 passenger and 17 freight and other trains.

##### Butting.

2nd, on Chesapeake Beach Railway, at Pushaw, Md., butting collision of passenger trains, badly damaging both engines. One engine-man and one fireman were killed and several passengers were injured. It is said that the conductor and engine-man of one of the trains made a mistake regarding the time of the other, a new timetable having just gone into effect.

3rd, on Cincinnati, Portsmouth & Virginia, at Batavia, Ohio, an eastbound freight train standing at a tank was run into by a westbound freight, and both engines and several cars were wrecked. One engine-man was injured.

3rd, on Kanawha & Michigan, at Raymond City, W. Va., butting collision between a passenger and a freight train; two trainmen injured. It is said that a flagman went out to protect the freight from the passenger, but that the signaling was not properly done.

5th, on Chicago & Northwestern, near Elgin, Ill., butting collision between a westbound passenger and an eastbound milk train; three passengers injured.

7th, on Pennsylvania road, near Williamsport, Pa., collision between a freight train and a work train, the latter being at a standstill, badly damaging both engines. One employee and a man in charge of horses were injured.

14th, 4 a. m., on Pittsburgh, Ft. Wayne & Chicago, at Lafayette, Ohio, collision between a freight train and a gravel train, damaging both engines; one engine-man injured.

15th, on Baltimore & Ohio, at Brook Tunnel, Pa., butting collision of freight trains, wrecking three engines and eight cars. Three tramps were killed and a fourth was injured.

20th, 2 a. m., on Chicago, Rock Island & Pacific, near Rush Springs, I. T., butting collision between a southbound passenger train and a northbound freight, the latter of which had two engines. Three engines and several freight cars were wrecked. Three trainmen were killed and five injured. It is said that the collision was due to a mistake in telegraphic orders.

20th, on Philadelphia, Wilmington & Baltimore, at Glen Mills, Pa., butting collision between a passenger train and a freight, badly damaging both engines, one baggage car and one freight car. Four trainmen and three passengers were injured. It is said that the freight train had run past a signal which was sent out to stop it.

20th, on Boston & Maine, near Newmarket, N. H., butting collision of freight trains, wrecking both engines and 14 cars. One trainman was injured.

21st, on Boston & Maine, at West Valley Falls, N. Y., butting collision of freight trains, wrecking both engines and several cars. One conductor was killed. The collision was due to forgetting telegraphic orders.

22nd, 2 a. m., on Chicago, Rock Island & Pacific, near Burlington, Colo., butting collision of passenger trains, wrecking both engines and the baggage and mail cars. Three tramps were killed. The eastbound train had been ordered to wait for the westbound at Bethune, but did not do so. The westbound train had been brought nearly, or quite, to a stop before the collision, the engine-man having seen the light from the electric headlight of the east-bound train.

27th, on Indiana, Decatur & Western, at Camargo, Ill., butting collision between passenger trains 1 and 2, due, it is said, to a misplaced switch. Both engines and one mail car were badly damaged. One fireman was killed and one engine-man fatally injured.

28th, on Central of New Jersey, at Hoffman's, N. J., butting collision of freight trains, badly damaging both engines and many cars; two trainmen injured. It is said that the collision was due to a misunderstanding of orders.

And 12 others on 10 roads, involving 1 passenger train and 23 freight and other trains.

#### Crossing and Miscellaneous.

1st, on Union Pacific, at Medicine Bow, Wyo., collision between a mixed train and two engines standing in the yard. The three engines and seven cars were badly damaged. A tramp was injured.

2nd, on Kansas, Shreveport & Gulf, near Nicholson, La., collision between a passenger train and an empty engine; fireman injured.

4th, 4 a. m., on Ohio River road, at Parkersburg, W. Va., a freight train ran over a misplaced switch and collided with several cars on a side track, among which was a tank containing gasoline, rupturing the tank. Several hours after the collision there was an explosion of gasoline which killed six persons, including the Superintendent and the Master Mechanic of the road, and injured 20 or more.

6th, on Delaware, Lackawanna & Western, at Utica, N. Y., collision of freight trains; one brakeman injured.

12th, near Norfolk, Va., collision between a freight train and an empty engine at the crossing of the Norfolk & Southern and the Norfolk & Portsmouth Belt Line, doing slight damage. By a derangement of the interlocking signals at the crossing go-ahead indications were given to both engine-men at the same time. It is said that boys had tampered with the signal wires.

22nd, on Delaware, Lackawanna & Western, at Leicester, N. Y., a freight train switching at the station was run into at the rear by a following freight and several cars were wrecked. One engine-man and one tramp were injured.

24th, 11 a. m., on Chicago, Milwaukee & St. Paul, at East Hastings, Minn., a special passenger train of two cars, carrying passengers who had been taken from train No. 42, which had been wrecked by a landslide near Wabasha, collided with a switching engine, doing slight damage. The conductor was injured. The switching engine, having been reversed and deserted, ran some distance back and had to be chased with a locomotive.

26th, on Bangor & Portland, at Mount Bethel, Pa., collision between a freight train and a light engine carrying officers of the road. Three of the officers were injured.

26th, near Braddock, Pa., engine No. 96 of the Union Railroad, "the largest engine in the world," drawing 10 freight cars, collided with a freight train of the Pennsylvania, at the crossing of the two roads; and, with its cars, fell down a bank into Turtle Creek.

27th, 11 p. m., on Union Pacific, at Perry, Kan., collision between a freight train of the Union Pacific and a locomotive of the Rock Island road; one engine-man injured.

29th, 4 a. m., at Milwaukee Junction, Mich., a circus train being backed through a Y from the Michigan Central to the Grand Trunk collided with a freight train of the latter road, wrecking a car in which circus employees were sleeping. Nine of the occupants of this car were injured, two of them fatally.

29th, 4 a. m., on Southern Pacific, at San Antonio, Tex., a freight train drawn by two engines collided with some platform cars standing on the main track, wrecking several cars. Three trainmen were injured. A flagman who should have stopped the freight says that the engine-man did not promptly respond to his signal, and that while he was making further efforts to attract attention his lantern went out.

31st, 5 a. m., on Seaboard Air Line, at Petersburg, Va., several cars broke away from a freight train and ran at high speed some distance down a grade, finally colliding with a wrecking train, throwing one of the wrecking cars down a bank. Nine employees were injured.

31st, on Baltimore & Ohio, at Mt. Savage Junction, Md., collision between a passenger train and a freight; four passengers and one trainman injured. There was a dense fog at the time.

And 22 others on 18 roads, involving 5 passenger and 36 freight and other trains.

#### DERAILMENTS.

##### Defects of Roadway.

8th, 9 p. m., on Grand Trunk, at Lansing, Mich., an eastbound passenger train was derailed at a switch and two passenger cars were overturned. A number of passengers were injured, but it is said that none of the injuries are serious.

11th, on Southern Pacific, near Delta, Cal., the rear car of a passenger train, a sleeping car, was derailed and fell down a bank, lodging very near the edge of the Sacramento River. Three trainmen and six passengers were injured. It is said that at the point of derailment the track was insecure, having been repaired the day before in consequence of a derailment of freight cars.

23rd, on Baltimore & Ohio Southwestern, near Washington, Ind., three cars of a gravel train broke through a trestle bridge; three employees injured.

And 4 others on 4 roads, involving 2 passenger and 2 freight trains.

##### Defects of Equipment.

4th, on Delaware, Lackawanna & Western, at Henryville, Pa., an eastbound freight train was derailed, probably by the breaking of a wheel, and two cars fell upon the westbound track. A westbound freight ran into the wreck and three trainmen were killed.

9th, on Pennsylvania road, near Columbia, Pa., a freight train was derailed by a broken flange, and seven steel cars, each containing about 50 tons of coal, fell into the canal alongside the track.

10th, on Delaware, Lackawanna & Western, near Sauquoit, N. Y., a freight train was derailed by a broken wheel and a brakeman was injured.

11th, 5 a. m., on Baltimore & Ohio, at Aberdeen, Md., a freight train was derailed by a brake shoe which fell on the track, and three freight cars were pushed into the station building. The station agent's family, sleeping in the second story, had the floors of their rooms lifted about 1 in.

17th, on Pennsylvania road, near Spruce Creek, Pa., a freight train was derailed by a broken axle and four cars fouled the adjoining passenger track. A passenger train came along before there was time to send out a flag and its engine was derailed and fell down a bank. Several

express cars were wrecked. The engine-man of the passenger train was killed and the fireman was injured.

19th, 3 a. m., on Denver & Rio Grande, near Buena Vista, Col., a freight train was derailed by a brakebeam which fell on the track, and six cars were wrecked. A tramp was injured.

20th, on Baltimore & Ohio, near Weverton, Md., an eastbound freight train was derailed by a broken axle, and several cars fell atoul of the westbound track. A westbound freight train came along immediately afterwards and was derailed by the wreck, many cars being piled up. A brakeman was killed and one trainman was injured.

24th, on Toledo, Peoria & Western, at Eureka, Ill., the locomotive of a passenger train was derailed by a broken flange and was overturned. The engine-man and fireman were injured.

25th, on Wabash road, near Custer Park, Ill., the locomotive of a passenger train running at high speed was derailed by the breaking of a driving wheel axle, and ran some distance on a high bank, and a short distance on a bridge, after leaving the rails. The engine-man jumped off and was injured.

26th, on Southern Pacific, near Beaumont, Tex., passenger train No. 7 was derailed by the breaking of one of the axles of the tender, and three passenger cars were overturned and fell down a bank. Seven passengers were injured, one of them fatally.

30th, 8 p. m., on Kansas City Southern, near Howard, I. T., a freight train was derailed by a broken wheel and a brakeman was injured.

And 16 others on 12 roads, involving 1 passenger train and 15 freight and other trains.

#### Negligence in Operating.

8th, on Denver & Rio Grande, at Ouray, Colo., a locomotive which had been started from a yard by a lawless tramp got beyond the tramp's control on a descending grade and was derailed and overturned. The tender was completely wrecked. The tramp was thrown off and fell down a bank, but was not much hurt.

13th, 7 p. m., on Southern Pacific, at Upton, two miles above Sisson, Cal., a part of a freight train (26 loaded cars) left unattended, ran back down grade, not enough brakes being set, and soon attained high speed. After running about two miles seven cars from the rear of the runaway string broke loose and fell down a bank; about two miles farther down another coupling parted and 17 cars were overturned and wrecked; the remaining six cars ran about 10 miles and were then derailed and wrecked.

17th, on Kings County Elevated Road, at Georgia avenue, Brooklyn, N. Y., a train of empty passenger cars, being switched, was derailed at a switch and three cars fell to the sidewalk of the street below, narrowly missing a number of persons passing in the street. The cars were wrecked.

17th, on Atchison, Topeka & Santa Fe, near Raton, N. M., a freight train drawn by two engines became uncontrollable on a descending grade and ran at high speed to a derailing switch, where both engines and six cars were wrecked. One engine-man and one fireman were killed.

24th, 4 a. m., on Cleveland, Cincinnati, Chicago & St. Louis, at Springfield, Ohio, passenger train No. 37 was derailed at a derailing switch. It is said that the signalman had been asleep and turned the switch immediately in front of the train, while he was confused.

30th, on Philadelphia & Reading, at Melrose, Pa., an eastbound express train was derailed and the whole train, except the forward truck of the locomotive, ran several hundred feet on the sleepers. The track was being repaired at this point and it seems that a temporary frog was not securely fastened.

And 10 others on 8 roads, involving 1 passenger train and 9 freight and other trains.

#### Unforeseen Obstructions.

11th, 3 a. m., on Baltimore & Ohio, at Folsom, Pa., a northbound express train was derailed by a misplaced switch and the engine was overturned. It is said that the switch had been tampered with.

15th, 1 a. m., on Cincinnati, New Orleans & Texas Pacific, near Greendale, Ky., a freight train was derailed by running over a cow, and two engines and 15 cars fell down a bank. Three trainmen and a boy stealing a ride were injured.

17th, on International & Great Northern, near Dodge, Tex., a work train was derailed by running over a hog and the engine was overturned. Two employees were killed and six injured.

23rd, on York Southern, near York, Pa., a freight train was derailed by gravel which had been washed upon the track, and the engine-man was injured.

24th, 5 a. m., on Chicago, Milwaukee & St. Paul, near Wabasha, Minn., passenger train No. 2 was derailed by running into a landslide. The engine-man and fireman were killed and three passengers were injured.

And 8 others on 7 roads, involving 3 passenger and 5 freight and other trains.

#### Unexplained.

1st, on Knoxville & Ohio, at Ivy, Tenn., the caboose of a freight train was derailed and wrecked; one brakeman killed and conductor injured.

2nd, on Montana Central, at Trask, Mont., a passenger train was derailed and several cars were ditched. Two passengers were killed and 32 passengers and one trainman were injured.

3rd, on Northern Pacific, near Borax, Mont., a mixed train was derailed and several freight cars fell down a bank. Eight passengers were injured.

5th, on Chicago, Milwaukee & St. Paul, near Amasa, Mich., a mixed train was derailed and five freight cars were wrecked. Two trainmen and one passenger were injured.

7th, on Pittsburgh & Western, near Herron, Pa., passenger train No. 20 was derailed and the engine-man was killed. The fireman was injured.

7th, on Pennsylvania road, near Saunders, Pa., the tender of an engine drawing a freight train was derailed and, there being a pushing engine at the rear of the train, seven cars were piled up on the derailed tender. A civil engineer riding on one of the cars of the train was killed and seven other employees were injured.

8th, on Pennsylvania road, near Pittsburgh, Pa., a freight train was derailed and one of the derailed cars ran against a number of cabooses standing on a side track; the cabooses were pushed across a street and a man and a woman passing in the street were killed. Three of their companions were injured.

10th, on Cincinnati, Hamilton & Dayton, near Dayton, Ohio, eastbound passenger train No. 54 of the Erie road



was derailed and a passenger car was partly overturned on a bridge. Several passengers were injured.

14th, 9 p. m., on Boston & Maine, near North Somerville, Mass., a freight train was derailed and one brakeman was injured.

15th, on Chicago, Rock Island & Pacific, at St. Joseph, Mo., a freight train was derailed and one of the cars was pushed completely through a small building. A man in the building was severely injured.

15th, 11 p. m., on Gulf, Colorado & Santa Fe, at Meridian, Tex., a freight train drawn by two engines was derailed, and a dozen cars were ditched. A brakeman was killed and three other trainmen were injured.

19th, on Wheeling & Lake Erie, at Bowerstown, Ohio, a passenger train was derailed at a point where the track had been weakened by a flood and six cars filled with passengers were ditched, some of them being overturned. Only one passenger is reported injured. It is not clear whether the derailment was due to the weakness of the track or to the breaking of one of the tender trucks.

21st, on Southern Railway, near Randolph, Va., a freight train was derailed; one trainman killed and one injured.

24th, on Allegheny Valley, at Pittsburgh, Pa., a freight train was derailed and one of the cars ran against a building and partly broke it down. Five trainmen were injured.

24th, on Rio Grande Western, at Commissary, Utah, an empty engine was derailed and overturned, and the engineman was scalded to death. The fireman was badly injured.

25th, on Chicago & Eastern Illinois, near Benton, Ill., a passenger train was derailed and nearly all of the cars were ditched. One passenger was killed and 14 were injured.

28th, 4 a. m., on Southern Railway, near Boydton, Va., a mixed train was derailed and several freight cars were ditched. One passenger and one trainman were injured.

30th, on Seaboard Air Line, near Petersburg, Va., a freight train was derailed and the conductor was injured.

31st, on Norfolk & Western, near Buffalo, W. Va., a freight train was derailed and several cars were ditched; two trainmen injured.

And 36 others on 30 roads, involving 7 passenger and 29 freight and other trains.

#### OTHER ACCIDENTS.

13th, on Lake Erie & Western, at Beeson, Ind., the locomotive of a passenger train was wrecked by the explosion of its boiler and the engineman was injured.

16th, on Pennsylvania road, near Millintown, Pa., a car in an eastbound passenger train was badly damaged by the lading of the car of a westbound freight, which projected too far out. One passenger was injured.

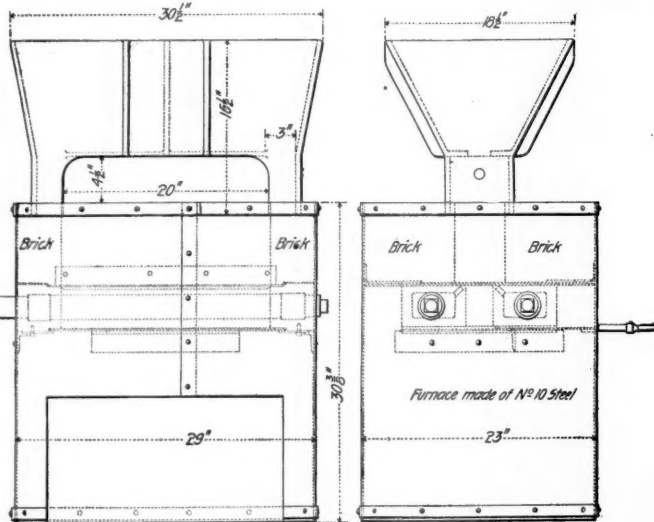
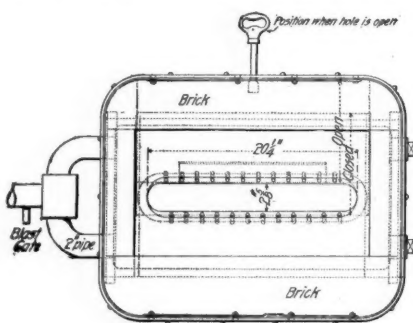
27th, on Northern Pacific, near New Rockford, N. D., a passenger train was struck by a hailstorm, and all of the windows on one side of the train, except two, were broken in.

And 6 others on 6 roads, involving 2 passenger and 4 freight trains.

A summary will be found in another column.

#### Flue Cutting and Welding at the D. L. & W. Shops.

The flue cutting machine shown in the accompanying illustration was designed at the Kingsland shops of the Delaware, Lackawanna & Western, where it has been in use for the past year doing work satisfactorily and in

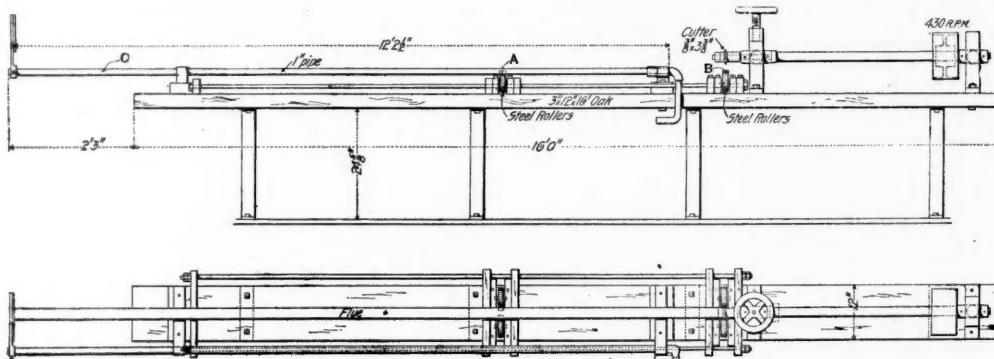


Welding Furnace—Kingsland Shops, D. L. & W. R. R.

less time than by former methods. The machine consists essentially of a cutter shaft, which is fitted in swivel boxes, the steel rollers A and B, and the adjusting rod C. In cutting a flue, the adjusting rod is set to the required length, the flue is then put on the rollers and the cutter which runs at 430 revolutions a minute, is fed through

the flue by turning the hand wheel. This machine is also used for cutting copper ferrules, used on the flue ends.

The welding furnace here illustrated was also designed at these shops. The blast enters the furnace through two 2-in. pipes and is distributed by passing through 24 1/2-in. holes, as shown. This assures a steady and uniform flow of the air. The coke is fed to the fire



Flue Cutter—Kingsland Shops, D. L. & W. Railroad.

through the 3-in. holes shown at the bottom of the coke pocket. There is an opening 20 in. x 4 1/2 in. through which the flues are passed into the fire. Six flues are generally being heated at one time. A blacksmith and helper working with this furnace and using a Hartz flue-welding machine have welded as many as 120 flues in one hour.

#### Eight-Hour Laws and Government Railroads.

The New York Republicans, in their Saratoga platform, say that they have established an "effective eight-hour day for all workmen employed on public works" and Gov. Roosevelt says that New York has been making a strong effort of late years to "set a good example" to private employers of labor.

States and municipalities, as well as the Federal Government itself, have established the eight-hour day for public employees. In many cases a minimum rate of wages also has been fixed by law. In Massachusetts, a few years ago that commonwealth paid as a minimum rate of wages to public employees \$2.00 a day, much above the market rate.

Of course the institution of an eight-hour day and the maintenance of a rate of wages above the market rate for public employees is not an end in itself. The expectation is that by force of public opinion other employers will be constrained to follow the example of the State in the matter of wages and of hours. It is proper to ask how far and in what way this expectation is likely to be fulfilled.

In this country the Government has not, as yet, undertaken to perform any but the simplest industrial services, so that the body of public employees is still small. Small as it is, however, it constitutes a favored class in the community, which is not without political power, even to-day, and as the State extends its industrial activities, this group will become more numerous, and politically more influential.

Such a group easily develops an *esprit de corps* not altogether consistent with democratic ideals of government, and wherever it comes to form a body sufficiently numerous to exert political pressure upon those in authority, its relations with the Government become exceedingly delicate. The Belgian Government, for example, has been forced

In the Australian colonies, also, the several governments are seriously compromised in the management of the government railroads and in their other industrial undertakings. No administration in New Zealand, or New South Wales, or Victoria which should set out to administer its railroads economically could hope to remain long in power. The experiment has been tried of reduc-

ing the number of employees on the government roads to something like the force required to operate a railroad in the United States or England. But the railroad employees are too powerful a civic body to tolerate anything of that kind. They insist upon employment as a political right, and upon the maintenance of an entirely artificial scale of wages. Any one who denies them that right, or proposes to reduce their wages, is at the next election rebuked by them at the polls in their character as voters, and supplanted in office by some one more considerate of their interests. In Australia the public employees do not have to go on a strike, as they do in Belgium, because in Australia they get what they want without recourse to such action.

It may be added that voters in Australia have had what they wanted in the way of employment upon the railroads so far chiefly at the expense of London capitalists, who have advanced money on security given by the colonial governments to build the roads and more or less to operate them. Now the Australian farmer, with some of the most fertile wheat lands in the world at his disposal, within a few hundred miles of the seaboard, cannot compete in Liverpool with the American farmer in Dakota, who must ship his grain much more than a thousand miles by rail overland. This state of affairs is a direct consequence of the political pressure which the employees of the railroads has brought to bear upon government officials for an extension of employment to themselves—even at the expense of borrowed money. The colonies have saddled themselves with enormous debts, and they have almost nothing to show for the money expended except a semi-pauperized group of public employees.

Evidence equally conclusive is not, perhaps, to be found in the experience of American commonwealths and municipalities, although a change of administration even in American cities not infrequently demonstrates that hundreds of men have been carried on public pay-rolls for no other purpose than to draw pay and vote for the party in power, and it is universally recognized that a great deal of the labor legislation annually enacted in the United States is simply a bid for political support. The postal clerks and letter-carriers, two years ago, undertook on rather an extensive scale to exert pressure upon individual Congressmen to vote for certain bills. The postal employees formed a sufficiently numerous body in certain close districts to control the election.

In the United States, as in other communities, the State is reaching out and extending its activities to new fields, assuming new industrial responsibilities. Sooner or later we shall be brought face to face with those problems which less conservative communities are facing to-day.—New York Evening Post.

#### Improvements on the St. Paul.

Elsewhere we review the report of the Chicago, Milwaukee & St. Paul for the year to June 30. Below are a few extracts from that report as to the betterment of the property:

The elevation of the track in the city of Chicago, from Central Park Boulevard to Mayfair, and from Hawthorne avenue to Wood street has been completed. The total cost of this work to June 30, 1900, is \$707,023.00, which has been charged to Renewal and Improvement Fund. The reduction of grades on the La Crosse Division, and Chicago & Council Bluffs Division, in Iowa, has been continued, and the expenditures therefor to June 30, 1900, are \$703,134.05 for the La Crosse Division, and \$338,231.32 for the Chicago & Council Bluffs Division, in Iowa. This expense has been charged to Renewal and Improvement Fund. A second main track has been completed from Savanna to Sabula Junction, with the exception of the line over the bridge, at a cost of \$53,172.98.

Second main track from Marion to Martelle in Iowa, a distance of 12.59 miles, is under construction—of which 2.71 miles were completed at the close of the year. This company is now engaged in the construction of ore docks at Escanaba. During the year 58.95 miles of side and

spur tracks have been constructed, the cost of which has been charged to operating expenses.

The total expenditure for rolling stock during the year—including that for replacement and that for additional equipment—3,013 cars and 33 locomotives—was \$2,190,931.92. The total freight car equipment has been equipped with automatic couplers, and 74.22 per cent. was equipped with air-brakes, at the close of the year. The average number of freight cars in service June 30, 1900, per mile of road was 5.6. There were in freight service June 30, 1891, 24,814 cars with a carrying capacity of 466,671 tons, while on June 30, 1900, there were 36,046 cars with a carrying capacity of 863,336 tons. Renewal of rails includes 62,624 tons of new steel rails, costing \$1,587,667.18. During the previous year 25,494 tons of new steel rails were laid, costing \$446,995.65. The weight of steel rails used in renewals is 75 pounds and 85 pounds per yard. Renewal of ties includes 1,827,838 new ties—costing \$775,581.02. During the previous year 1,340,924 new ties, costing \$460,972.07, were placed in track.

The expenditures for repairs of bridges include the total cost of 88 steel bridges, aggregating 8,081 feet in length—replacing an equal number of wooden bridges; the filling of about 3.56 miles of pile bridges with earth—293 bridges having been completely filled and 103 reduced in length by filling; and the replacing of 236 wooden culverts with iron. The cost of these above the cost of renewal in the original form was \$427,293.67.

The Board has continued the policy which has prevailed for several years past, of making improvements of the property and including them in operating expenses, when the earnings justify. The principal items of improvements charged as operating expenses are new passing, side and spur tracks; ballasting lines not heretofore ballasted; strengthening bridges and replacement of wood with steel; filling openings; new fences; new freight and passenger stations; improvement of grades and alignment; elevation of tracks at Chicago. It has seemed prudent also to charge operating expenses with the cost of building cars during the year past against the time when there will be a large number of small cars to be retired from service.

#### Fuel Performance of a Heavy Locomotive.

In our issue of June 22, page 429, appeared a description, with drawings, of a compound decapod locomotive built by the Baldwin Locomotive Works for the Minneapolis, St. Paul & Sault Ste. Marie Railway. This engine was guaranteed to haul 2,000 tons of cars and load, at six miles an hour, up a grade of 42 ft. per mile, compensated for curvature. The engine has 17 and 28 x 32 in. cylinders, 55 in. driving wheels, 215 lbs. steam pressure, and weighs, in working order, 207,210 lbs. Of this weight 184,360 lbs. is on the drivers. The total heating surface is 3015.7 sq. ft. and the grate area 37.5 sq. ft. In the table herewith appears a report of the performance of this engine on three trips made last month, over a division 111 miles long. It will be seen that the consumption of coal is unusually low and this, we take it, is one of the matters to consider as well as the capacity of the locomotive to haul a heavy load.

Performance of Engine 600, Minneapolis, St. Paul & Sault Ste. Marie, August 21, 22 and 23, 1900. Distance, 111 Miles.

Tons.			Cars		Ton-Miles	Tons Coal Used	Lbs. Coal per Ton-M.
Net.	Tare.	Total.	Loaded	Empty			
1205.9	790.7	1996.6	58	0	221622.6	11.1150	1644
Max. 1:58.8	937.47	2:52.27	60	6	222782.8	11.425	1607
1227.7	785.05	2012.75	58	0	223415.25	10.1450	960

There are 7 miles omitted on the trip of Aug. 26 (the last in the table) account of doubling over a piece of 68 ft. grade.

#### The Ingersoll-Sergeant Drill Co. at Paris.

We have already noted the fact that the Ingersoll-Sergeant Drill Co. received a gold medal at the Paris Exposition. The exhibit of this company was one of the most extensive from the United States and was shown in three places. In the Palace of Machinery and Electricity is one of the company's Class II compressors in operation to supply air for the pneumatic tool companies' exhibits. This compressor has duplex steam and compound air cylinders with intercooler. It has automatic regulation, cutting off the steam supply or opening it as the air pressure varies. The compressor regulates to within one of one and a half pounds in this case. In the Civil Engineering and Transportation group the company shows a small motor-driven compressor, installed by the United States Government to furnish air to models of the machinery used on the Chicago Drainage Channel. Here are working models made to one-eighth scale, illustrating a bar channeler, a track channeler, a standard rock drill and a Class A compressor. Here is shown also a compressed air coal cutter. The main exhibit of the company is at Vincennes, where it occupies 1,400 sq. ft., and here are two compressors installed and a variety of mining and quarrying apparatus. Here air is compressed for service in the Palace of Civil Engineering and Transportation, 900 ft. away, where it runs two Baldwin locomotives, the

Westinghouse brake and signal exhibit and that of the Standard Signal Co. and of other exhibitors. Another line goes to the machinery annex building and supplies air to the Chicago Pneumatic Tool Co., the Q. & C. Co., the Standard Pneumatic Tool Co., and others. Two compressors installed at Vincennes furnish air at about 100 lbs., with a volume of 1,000 cu. ft. of free air per minute.

#### The Galveston Calamity.

The West Indian storm which reached the Gulf Coast Saturday morning, Sept. 8, wrought awful havoc in Texas. An appalling disaster has befallen the city of Galveston, where probably five thousand persons were killed and a tremendous property damage incurred. At other towns along the low coast line of Texas and as far as a hundred miles inland many lives were lost, and there was great destruction of property.

Galveston is on an island. Every part of the city is low, and it is said that every street in the city was submerged, the highest being covered for hours to a depth of 5 ft. A press despatch of Tuesday gives the following report: The terrible storm was predicted by the Weather Bureau to strike Galveston on Friday night. It created much apprehension, but the night passed without the prediction being verified, but by 10 o'clock Saturday morning the wind blew a gale; at noon it had increased in velocity and was driving the rain, and tearing things up in a lively manner. People near the beach were aroused to the danger that threatened their homes, and began a hasty exit to safe places in the city. Two gigantic forces were at work. The Gulf drove the waves with irresistible force high on the beach on the south side of the city, and the gale from the northeast pitched the waters against and over the wharves on the north side, choking the sewers and flooding the city from that quarter. The streets rapidly began to fill with water, communication became difficult, and the helpless people were caught between two powerful elements, while the winds rapidly increased in velocity. Railroad communication was cut off shortly after noon, the track being washed out; wire facilities completely failed at 3 o'clock, and Galveston was isolated from the world.

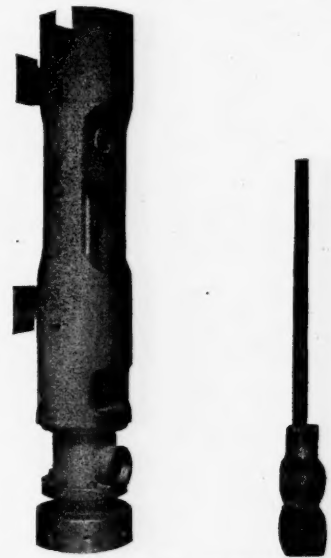
The wind increased in velocity, while the waters rapidly rose, and the night drew on with dread depicted on the face of every one. Already hundreds and thousands were bravely struggling with their families against the mad waves and fierce wind for places of refuge. The public school buildings, courthouse, hotels, etc., became crowded to their utmost. At 6:28 p. m., just before the anemometer blew away, the gale had reached the velocity of 100 miles an hour. Buildings tumbled and crashed, carrying death and destruction to hundreds of people. Roofs whistled through the air, windows were driven in with a crash or shattered by flying slate, telegraph, telephone and electric light poles with their masses of wires, were snapped off like pipestems, and water communications were broken. The lowest point touched by the barometer in the press correspondents' office, which was crowded by frightened men and women, was 28.04½. That was about 7:30 p. m. By midnight the storm had passed. The water, which had reached a depth of 8 ft. on the Strand at 10 o'clock p. m., began to ebb rapidly, and by 5 a. m. Sunday the crown of the street was free of water.

were called out to prevent robbery and vandalism. The Mayor estimates that one-third of the residence portion of the city has been swept away. The Southern Pacific freight terminals are reported damaged to the extent of many thousands of dollars, but the Union Passenger Station, owned by the Santa Fe, is said to be damaged but little. Disasters to shipping are not yet fully known. The steamship Cumberland sank at her wharf. Steamship City of Everett sank at her anchorage off Quarantine. Steamship Taunton, British, ran aground at Pelican Island. Steamship Mexican, British, was stuck in mud up the bay. Steamship Pensacola, for Pensacola, Fla., put to sea during the storm.

Damage at other places was great, but Sabine Pass is said to have escaped without great loss. Many buildings were damaged in Houston. The railroads were blocked many miles this side of Galveston.

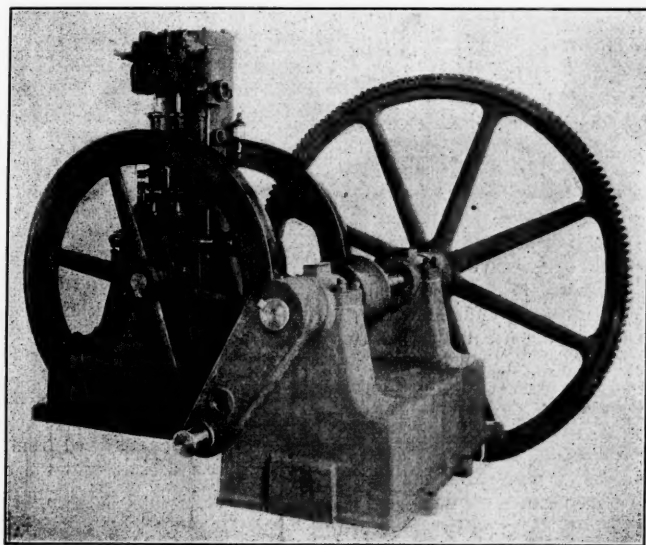
#### Stickney Combination Gasoline Engine and Pump.

The Charles A. Stickney Company, St. Paul, Minn., is now making in addition to gasoline engines for power purposes several combinations with water pumps, air compressors and hoists and such a combination gasoline engine and deep well pump is shown by the accompanying engraving. Three of these have just been built for the Chicago Great Western. The combination consists of a Stickney standard vertical gasoline engine of 15 h.p., mounted on a subbase carrying pedestals for the



Packing Head and Pitman.

slow speed crank shaft. The engine shaft drives through bevel gears a cross-shaft upon which are mounted the governor and the cams which operate the valves. An explosion occurs every second revolution and the speed is controlled by throttling the mixture admitted to the cylinders. Two electric igniters are provided, either of which can be put in operation while the engine is running. The engine shaft, which carries two heavy fly wheels, drives through spur gearing and a positive



Stickney Combination Gasoline Engine and Deep Well Pump.

The beach in the southwestern part of the city was under 10 ft. of water, and the barracks, located there, are destroyed, the soldiers having a miraculous escape from drowning. Many substantial houses in the western and southwestern parts of the city were destroyed.

The horrors of Sunday were as nothing compared with Monday's. An attempt was made to bury the dead, but the ground was full of water, and it was impossible to dig trenches. Many bodies were taken to sea for burial.

On Tuesday martial law was declared, and the militia

clutch the slow speed shaft, which is geared to make 20 revolutions a minute. This shaft carries a box crank, having either a 36 and 42 in. stroke, and also a nigger head for pulling the well. The engine is designed to be set at the side of a pit with a packing head and guides at the bottom, about 12 ft. below the base of the engine. This is connected to the crank by a pitman, which, with the packing head, is shown by the engraving. These pumping engines are made in five sizes from 8 to 25 h.p. A catalogue will shortly be issued descriptive of these different combinations.





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#### EDITORIAL ANNOUNCEMENTS

**CONTRIBUTIONS**—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

**ADVERTISEMENTS**—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.

The longer life of nickel steel stay bolts, which was indicated by tests of bolts subjected to repeated reversals of stress in a testing machine, does not seem to be borne out by the few service trials so far made on locomotive fire-boxes and reported to us. The Wabash Railroad some two years ago put some nickel steel stay bolts in service, and Mr. J. B. Barnes, Superintendent of Motive Power and Machinery, now says that the service given is about equal to that of iron bolts made from Tennessee charcoal bloom, and if anything the iron bolts show a longer life. As a result of this test, the Wabash has discontinued the use of nickel steel for stay bolts. The Chicago, Burlington & Quincy applied some nickel steel stay bolts to an engine in November, 1897, but they were put so near the mud ring that it was not a severe test. In that case nothing has so far developed showing any particular advantage of nickel steel over ordinary iron bolts, and Mr. Delano says the subject is no longer being specially followed up. Obviously these experiences alone do not justify any conclusion one way or the other.

The progress achieved by the Mallet articulated compound locomotive, as described by M. Mallet, constitutes an interesting record, a review of which is presented in another column. Most locomotive men in this country know something of the merits of this machine, for it has been used many years. They know, also, that localities are not lacking in this country where such an engine could do excellent work. The fact that they have refrained from adopting the Mallet type is evidence that they have seen or have believed that they have seen a more direct solution to their problem. It is probable that the Mallet type is more easily evolved from the usual form of European engine with its plate frames than from a typical American engine. This fact, added to the increased complication of the Mallet engine and to difficulties introduced by the flexible steam connections which its design involves, have doubtless been considered as outweighing the evident advantages to be derived from its use. It should be clear that the Mallet engine can never in any large sense become a general purpose machine. Its flexible wheel base allows it to pass short curves, and it may be so designed that it will draw heavy loads, but it can only move at low speeds. Its wheels must always be of small diameter. The Mallet engine has a much greater range of service than the Shay locomotive, but it is nevertheless more logically classed with such an engine than with the freight or passenger engines employed in general service on American roads.

In the case of a drawbridge disaster, which happened years ago, before the days of interlocking.

where a number of passengers were killed, it was said of the engineman, who also was killed, that he deserved his fate, because of his habitual recklessness; he had said that "no damned red flag" was ever going to stop him unless he saw fit to stop. The conduct of engineman Davis in the Hatfield collision of September 2 shows that that kind of men are still running locomotives of passenger trains. It would be almost incredible (on an old and important line) if we did not have such a circumstantial account of it. The jury in this case was unusually intelligent, and it appears to have weighed the evidence with pretty good judgment; but every competent railroad critic will place 90 per cent. of the blame on the engineman. The verdict of the jury (which we summarize in another column), is noticeable for its careful use of terms implying different degrees of censure. Its omission of all censure of the company will not, of course, prevent the courts from holding the company liable in large damages for deaths and personal injuries. The censure of the train despatcher may be deserved, but there is little in the evidence that we find in the Philadelphia papers which condemns him, so far as this particular case is concerned. If he is blameworthy, it is more likely because of the very lax enforcement of the time-interval rules in the past. This feature also, is almost incredible. As we have said, the chief blame is on the engineman, because the time-interval rule was enforced by the flagman at Souderton; but the fact remains that this flagman was the only one, out of two, four or more persons, all equally responsible for stopping the train, who actually did try to hold it. But the culpability of these negligent station men is, perhaps, mitigated by a discipline which permitted the rules to be habitually disregarded. It appears that trains are in some cases scheduled less than five minutes apart.

The question why the Reading does not provide a block system, on a passenger line, doing a good business, will of course receive the attention of the public. This phase of the case is tersely stated by the Philadelphia Press, whose editorial is noticed in another column. This road has spent very large sums on automatic block signals for parts of its lines, and for a part of this very line where the collision occurred. This shows that the officers appreciate the value of the space-interval principle. But the financial problem is a difficult one, requiring force and courage to settle it on the right basis. The condition is summed up in the statement that in a long series of years the work of the road has increased while the money received for doing the work has decreased. In such a situation the directors must indeed exercise foresight and firmness, and at best take large financial risks. But there is no alternative, any more than there is in handling freight cheaply. If your competitors carry coarse freight at two mills per ton per mile, you must do the same, even if it necessitates doubling your capital, or else lose the business. So in passenger business. Block signals are costly, and passenger earnings do not furnish the money to buy them; but the public is fast learning to demand this safeguard, and as the people learn they will insist, whether the task of raising the capital be easy or otherwise.

Railroad officers who think that the time-interval can in many situations be made to work as satisfactorily as the space-interval, should note the illustration, afforded by this instance, of the relation of the two systems to discipline. The engineman disregarded the red flag because he was allowed to be partly his own judge as to how far the milk train was ahead of him. If the block system had been in force, this feeling that he could judge for himself would have been long since eradicated from his mental habit. It may perhaps be said that the block system, particularly the automatic, does not necessarily, by its nature, surely enforce this change of mental habit; but the fact is that in practice the change is effected, and that is enough. The red flag at Souderton indicated that probably the preceding train had not reached the next station; if the block system had been in force, a red signal at Souderton would have indicated that the preceding train had *certainly* not reached the next station. This difference, apparently slight, makes it possible to enforce good discipline with one system where it is difficult to enforce it with the other. In this we are speaking, of course, on the assumption that the grade of intelligence and character among the men is the same in both cases. Improving the men has been known to make a great change in either system.

#### Our Exports of Iron and Steel.

In the year which ended June 30 the builders of the United States exported locomotives to the value of \$5,392,403. The increase in value over the exports of 1899 were 18 per cent. and over 1898, 44 per cent. The average price was \$10,650; in 1899, \$9,160 and in 1898, \$8,300. The tonnage is not given in either year and therefore these prices do not mean much. Presumably the average weight has increased from year to year; but whether or not it has increased as much as the average price only the builders themselves can tell,—probably not. The returns of the Government do not tell to what countries these locomotives went. The exports of locomotives in each of these three years was an important part of the total product of our contracting shops. We have no estimate of the value of that total product, but the statistics which we collected and published last December show that in quantity about 20 per cent. of the locomotives built were sold abroad. In other recent years this proportion has been even greater, reaching as much as 31 per cent. in 1897. The foreign trade therefore has become a very important thing for our builders and apparently it rests with them to hold and increase this trade by the quality of their product and by their business skill and enterprise. Speaking at Saratoga last June, Mr. Vauclain said that from 25 to 33 per cent. of the engines built by the Baldwin works in the calendar year 1900 will be exported.

The exports of rails in the year ending June 30, 1900, amounted to \$9,218,144 and the increase was 74 per cent. over 1899 and 100 per cent. over 1898. Notwithstanding the important increase in the quantity exported it is still a small part of the total product. Probably in 1899 it was about 13 per cent.; but as the rail product is reported for the calendar year and the exports for the fiscal year comparisons are only approximate. The average price of export rails like that of locomotives has risen materially. In 1890 it was \$27 per ton; in 1899 and in 1898, it was \$20. The change in destination of these rails is interesting. British North America has been and still is our most important customer, but in 1900 the Asiatic consumption (other than Japan) suddenly became important. The Chinese Eastern Railroad (the Russian Manchurian line) explains this. The countries which took rails to amounts over half a million dollars in either of the last three years were as below, the values of their respective takings being given in dollars:

	1900.	1899.	1898.
British North America.....	\$2,882,667	\$1,720,503	\$1,555,405
Asia and Oceania.....	2,168,140	873,253	513,358
Japan.....	1,420,625	192,588	1,150,766
Mexico.....	747,822	587,589	561,151
Europe.....	658,532	581,753	426,427
Africa.....	401,186	782,693	63,735

Our exports of cars in the year just ended amounted to \$2,554,907 for steam railroads and \$984,354 for "other railroads,"—presumably street cars. In these items also the increase has been great. Our exports of structural iron and steel reached \$2,835,588; of wire, \$5,982,400, and of builders hardware, saws and tools, \$9,646,017, or more than the rail exports. Metal working machinery was exported to the amount of \$7,193,390, and electrical machinery to \$4,328,917. The pig iron export fell off a little, from \$3,290,628 to \$3,122,573.

Our total exports of iron and steel and manufactures thereof reached the immense total of \$121,858,344; the increase over 1899 was 30 per cent. and over 1898, 73 per cent. Only three other great divisions of our export trade surpassed iron and steel, viz., provisions (comprising meat and dairy products) \$184,431,716; breadstuffs, \$262,734,026; cotton and manufactures thereof, \$266,968,979.

In a time of intense interest in the growth of foreign trade it is well to know pretty accurately who are our customers that we may judge of the lines of least resistance along which growth may be promoted. Our total exports the last fiscal year were 1,394 million dollars and of this 1,040 went to Europe, or 75 per cent. North America took 13½ per cent.; Asia and Oceania, 7¼ per cent., and South America, 2 8-10 per cent. That is an increase of one per cent. in our exports to Europe would almost equal in amount an increase of 10 per cent. in our exports to all Asia and Oceania. And further, 50 per cent. of our total exports go to the United Kingdom and to the British possessions and colonies. In other words, the best chance for trade is with the great trading race.

#### July Accidents.

Our record of train accidents in July, given in this number, includes 84 collisions, 118 derailments and 9 other accidents, a total of 211 accidents, in which 45 persons were killed and 215 injured. The detailed list, printed on another page, contains accounts only of the more important of these accidents. All which caused



no deaths or injuries to persons are omitted, except where the circumstances of the accident as reported make it of special interest.

These accidents are classified as follows:

	Collisions.	Rear.	Butting.	Crossing and Other.	Total.
Trains breaking in two....	4	0	0	0	4
Misplaced switch.....	1	1	1	4	6
Failure to give or observe signal.....	2	3	5	10	
Mistake in giving or understanding orders.....	0	6	1	7	
Miscellaneous.....	6	2	6	14	
Unexplained.....	9	14	20	43	
Total.....	22	26	36	84	

Deraillments.

Broken rail.....	2	Track repairers.....	2
Loose or spread rail.....	2	Bad switching.....	3
Defective bridge.....	2	Runaway.....	2
Defective switch.....	1	Engine or cars left untended.....	3
Broken wheel.....	8	Animals on track.....	4
Broken axle.....	11	Landslide.....	4
Broken truck.....	4	Washout.....	2
Fallen brakebeam.....	1	Malicious obstruction.....	2
Brake hose burst.....	1	Accidental obstruction.....	5
Failure of drawbar.....	1	Unexplained.....	5
Broken slide rod.....	1		
Misplaced switch.....	5		
Derailling switch.....	1		
			118

Other Accidents.

Boiler explosion.....	1
Broken slide rod.....	1
Cars burned while running.....	3
Other causes.....	4
Total number of accidents.....	211

A general classification shows:

	Col-lisions.	Derrail-ments.	Other acci-dents.	Total.	P. c.
Defects of road.....	0	7	0	7	3
Defects of equipment.....	4	27	2	33	15
Negligence in operating.....	37	16	3	56	26
Unforeseen obstructions.....	0	13	4	17	8
Unexplained.....	43	55	0	98	47
Totals.....	84	118	9	211	100

The casualties may be divided as follows:

	Col-lisions.	Derrail-ments.	Other acci-dents.	Total.
Killed—				
Employees.....	11	17	0	28
Passengers.....	2	4	0	6
Others.....	9	2	0	11
Totals.....	22	23	0	45
Injured—				
Employees.....	55	51	1	107
Passengers.....	24	74	1	99
Others.....	3	6	0	9
Totals.....	82	131	2	215

The casualties to passengers and employees, when divided according to classes of causes, appear as follows:

	Pass. killed.	Pass. in-jured.	Emp. killed.	Emp. in-jured.
Defects of road.....	0	9	0	6
Defects of equipment.....	1	6	5	8
Negligence in operating.....	2	24	13	55
Unforeseen obstructions and maliciousness.....	2	46	4	10
Unexplained.....	1	14	6	28
Totals.....	6	99	28	107

Twenty-five accidents caused the death of one or more persons each, and 48 caused injury but not death, leaving 138 (65 per cent. of the whole) which cause no personal injury deemed worthy of record.

The comparison with July of the previous five years shows:

	1900.	1899.	1898.	1897.	1896.	1895.
Collisions.....	84	96	76	47	35	33
Deraillments.....	118	116	80	97	65	52
Other accidents.....	9	5	4	2	3	3
Total accidents.....	211	217	160	146	103	88
Employees killed.....	28	31	30	16	23	16
Others killed.....	17	14	10	9	79	9
Employees injured.....	107	100	95	56	33	48
Others injured.....	108	101	37	60	154	28
Average per day—						
Accidents.....	6.81	7.00	5.16	4.71	3.32	2.84
Killed.....	1.45	1.45	1.29	0.81	3.29	0.81
Injured.....	6.94	6.48	4.26	3.74	6.03	2.45
Average per accident—						
Killed.....	0.21	0.21	0.25	0.17	0.99	0.28
Injured.....	1.02	0.93	0.83	0.70	1.82	0.86

The totals in the present record are remarkably near the same items in the record for July, 1899. The accidents in which persons were killed were those at Trask, Mont., on the 2nd; Benton, Ill., on the 25th; Beaumont, Tex., on the 26th, and Milwaukee Junction, Mich., on the 29th. The last was not a passenger-train accident. At Pushaw, Md., there was a butting collision due to a cause which does not seem to occur as frequently as in former years, the forgetfulness of a conductor and engineer on the day that a new time-table went into effect. This kind of negligence, though rare, seems to be somewhat persistent, and it is to be observed that this is an element of risk in train running for which the block system would undoubtedly be a perfect remedy. At Norfolk, Va., on the 12th, we have a collision due to a very unusual cause, disarrangement of signal wires by mischievous boys. Near Sisson, Cal., on the 13th, a whole freight train of 30 cars was wrecked by being allowed to run away on a very steep grade. This was due to a kind of negligence that occurs now and then on all roads; but not every aspirant for this kind of notoriety succeeds in scattering the evidence of his carelessness along a dozen miles of the road.

The number of street car accidents reported in the newspapers in July was unusually large. We have accounts of 28 cases, including the usual assortment of collisions, runaways and ordinary deraillments, and also one or two cases of cars being struck by lightning, one butting collision due to the signal lights having been tampered with, and one butting collision with a gravel train. The number of casualties in these 28 accidents aggregate 51 persons killed and 232 injured. It will be noted that

these would be large totals even if we omitted the Tacoma disaster of July 4, in which 40 persons were killed and the number injured was reported as 60. The Tacoma disaster was reported in the *Railroad Gazette* of July 13, p. 485, and July 20, p. 496.

Annual Reports.

*New York Central.*—The present administration has been in charge of the New York Central for something over two years. Evidences of the effect of changes in the company's operating methods were seen in last year's report, but they are far plainer now.

The New York Central property never did so well as in the year just ended, whether the record be examined in view of surplus, traffic carried or operating efficiency. The statistics bearing on this latter point indicate more clearly than any other part of the report how substantially New York Central's operations have been improved in the past two years.

Changes in the property owned and in the capital account have been so striking, however, that it is perhaps only natural that they should take first place in the consideration of the company's results for the year. The expansion in mileage controlled, which began in 1898 by the purchase of the Lake Shore and the Michigan Central properties, was extended in the past year by purchasing heavy interests in the Big Four, Lake Erie & Western and Chesapeake & Ohio stocks. In the two former purchases the company acted in conjunction with the Lake Shore. The Chesapeake & Ohio purchase was carried out under an agreement with the Pennsylvania, that company and the New York Central interests now controlling the property. The Central's interest in the Big Four is carried on its books at \$4,307,380; the Lake Erie & Western at \$2,897,640, and the Chesapeake & Ohio at \$1,638,455. The Big Four also has an interest in the latter property, stated in its annual report as \$2,453,000. By these purchases the Central's system has grown to embrace 10,280 miles of road.

This total includes the Boston & Albany, not yet formally merged, but not the Chesapeake & Ohio, in which the Vanderbilt interest is not a clear majority.

The statistics of the report, however, are on a total of 2,817 miles, as compared with 2,585 miles, operated during 1899, except in the last two months of that year, when the total was 2,828 miles. The increase is accounted for by the Fall Brook lines taken over on May 1, 1899. This increase in mileage affects the accuracy of the revenue comparisons despite the fact that the 1899 figures have been revised, from the totals published a year ago, so that now they include the figures of the Beach Creek and Wallkill Valley lines for the two fiscal years.

The gross earnings, for instance, in 1900, at \$54,562,952, were \$6,438,936 over the preceding year, of which, however, \$2,018,844 was due to the increased mileage, and the balance to the general activity in business. Of the \$3,880,429 increase in expenses part was due to the larger mileage, part to the heavier traffic movement, and \$1,691,060 to extraordinary disbursements, additions and improvements. The net earnings were over two and a half million dollars, more than the New York Central has shown for many years. Even allowing for the higher charges, chiefly due to rentals on the Fall Brook lines, the increase in net income was exceptional, as will appear by the comparisons given below:

	1900.	1899.	Increase.
Net operating earnings.....	\$20,511,365	\$17,952,859	\$2,558,506
Dividends and miscellaneous income.....	4,716,745	4,336,252	380,493
Gross income.....	\$25,228,110	\$22,289,111	\$2,938,999
Charges.....	17,249,083	16,001,236	647,847
Net income.....	\$7,979,027	\$5,687,875	\$2,291,152
Dividends.....	4,937,500	4,000,000	937,500
Surplus.....	\$3,041,527	\$1,687,875	\$1,353,652
Improvement fund.....	2,000,000		

An increase in stock of \$15,000,000 was made to provide new equipment. Of the proceeds of the stock, which was sold to stockholders at par, when the shares were at a premium of 37 points, \$13,625,632 was expended in the year for 150 engines, 15,600 freight cars and other equipment. Our readers are quite familiar with the great increase in power of engines and capacity of cars that has lately been made and with the enormous trains now hauled.

In 1900 the increase in ton-miles was 862 millions; from 1894 to 1898 it was 1,493 millions, but during this time no material addition to equipment was made, as may be seen below:

	Locomotives.	Freight cars.	Passenger cars.
1900.....	1,303	59,180	942
1899.....	1,198	46,978	972
1898.....	1,188	42,485	952
1897.....	1,181	41,436	955
1896.....	1,173	42,919	964
1895.....	1,225	41,070	972
1894.....	1,262	42,190	966
1893.....	1,242	42,561	979

While the totals of equipment remained unchanged the capacity was considerably enlarged, but there was obviously a different conception of the possibility of economy and efficiency than that indicated by last year's orders. It may also be noted that the rolling stock has been in increasingly profitable use lately. In 1900, freight train-mile earnings at \$2.03 were higher than recorded since 1875, despite the lowest average ton-mile revenue received, but little over half a cent. Average train and car loading has made decided advances since 1898, whereas previously one year's figures were not much different

from those of another. This is brought out in the following comparisons:

	Rate per ton-mile, cent.	Freight train-mile revenue.	Revenue train load, tons.
1900.....	.50	\$2.03	383
1899.....	.56	1.88	338
1898.....	.58	1.82	304
1897.....	.65	1.85	283
1896.....	.65	1.82	279
1895.....	.70	1.85	264
1894.....	.72	1.84	257

On the main line of the New York Central proper the average load of all freight was 794 tons, the last year.

The progress in developing the transportation efficiency of the property, shown by these figures, is further illustrated by the statement that during 1900 an increase of 4,467,000 tons reported on the same mileage as worked in 1899 was carried without increase in freight train mileage. Again, whereas, in 1898, cost of conducting transportation was 40.33 per cent. of the total expenses, in 1900 it was reduced to 36.48. In the maintenance departments we find the heavy increase in operating expenses. Maintenance of way charges last year increased \$2,218,509, or 44½ per cent., and were \$2,580 per mile of road and \$1,663 per mile of track.

*Cleveland, Lorain & Wheeling.*—This is a short rail road, only 192 miles long, and 67½ per cent. of its tonnage is coal, coke and ore carried at a low rate. Last year the average rate received was 4.82 mills per ton-mile. Obviously, such a property must be worked not only economically but intensely in order that the small possible profit per unit of work shall yield a balance of net earnings at the end. Fortunately, the traffic is dense; last year the ton-miles carried, per mile of railroad worked, amounted to 1,976,568, which is more than three times as much work as is done on the average mile of railroad in the United States, and nearly as much per mile as is done on the New York Central east of Buffalo, where the ton-miles of revenue freight per mile of road were 2,136,000 in the year just ended. The train load on the Cleveland, Lorain & Wheeling was 347 tons and its earnings per train mile amounted to \$1.67, and the gross earnings were over \$10,000 a mile. It will be seen, therefore, that the present management is succeeding in working the property hard. But the report to the stockholders informs them that the character of the business, which necessitates the movement of a large tonnage at a low rate, requires exceptional facilities. It is the aim of the management to provide these facilities and to raise the property to a high physical standing. With this in view, large expenditures have been made during the year, increasing the bonded debt and causing unusual charges to operating account. In the reorganization of the finances of the company, some four millions of consolidated refunding mortgage bonds has been reserved for extensions, additions and improvements. In the year just closed the gross earnings increased 29 per cent. and the net earnings 30 per cent., notwithstanding a heavy increase in charges to the items of maintenance of way and maintenance of equipment, which charges amounted to 43.67 per cent. of the total working expenses. Freight contributed 87.55 per cent. of the gross earnings, and the freight earnings increased 32 per cent. in the year, while the ton miles increased 31 per cent.

*Norfolk & Western.*—Since its reorganization, in 1896, the Norfolk & Western has been a good example of revolution in railroad conditions. In the past year it has been specially prominent, because of the favorable results of working, and because, as one of the principal carriers of soft coal to tide water, it has been included in the extensive purchases by the Pennsylvania in recent months. Four vice-presidents of the Pennsylvania are now directors of the Norfolk & Western.

On practically the same mileage, Norfolk & Western last year increased its gross revenues by \$2,263,865, or 19 per cent., and its expenses only \$561,993, or 7 per cent., so that its net earnings were larger by \$1,701,873, or 44 per cent. In the past two years the increase in gross revenue has been \$2,855,000, or 25 per cent., and the increase in net \$2,239,900, or 67 per cent., and the operating ratio has been reduced from 70 per cent. to 60.13 per cent. The company earned in 1900 a balance over all charges of \$3,338,000, which provided for the 4 per cent. preferred dividends and a balance of practically 4 per cent. on the outstanding common stock of \$66,000,000. In 1896, operating 1,570 miles, against 1,552 last year, it earned gross \$11,056,000, and net \$2,325,000, so that last year the surplus for dividends exceeded by over a million dollars the balance earned four years ago toward interest.

This substantial prosperity enabled the company to appropriate \$1,500,000 as a special fund for betterments to be devoted chiefly to replacing wooden bridges on branch lines. Since the reorganization, the company has been actively improving its property, and besides the work whose cost has been met out of earnings has charged \$3,961,500 to capital. Of this amount \$1,180,893 was for new construction, \$1,922,226 for equipment, \$369,223 for safety appliances and \$489,108 for betterments and improvements.

The ability of the Norfolk & Western to turn over so large a proportion of its gains in gross earnings into net and to spend so much for improvements is due largely to important transportation economies. Charges for maintenance of way in 1900 were over \$1,000 per mile of road operated; in 1899 \$988 and in 1895 nearly \$1,000. Equipment has been greatly improved, and this account in 1900 shows an increase of \$205,700, or 11 per cent. It includes charges for replacing all equipment destroyed,



\$288,000 for depreciation, and the cost of automatic couplers.

Conducting transportation expenses increased \$289,883, or less than 10 per cent., whereas, the tons one mile increased 276,500,000, or 11 per cent., and the passenger miles increased about 8,500,000, or 12 per cent. Train mileage decreased in both instances, freight train mileage by 111,715 miles, and passenger train miles by 51,096. This, of course, implies a heavy increase in the train load, and, as a matter of fact, these figures reached to totals hitherto unapproached, and show extraordinary increases over those a few years ago. The average freight train load was 435 tons, against 384 tons in 1899 and 355 tons in 1898.

The average ton-mile revenue, after continuous yearly declines, touched 3.97 mills on all freight in 1899, but shows an increase to 4.30 mills this year. The increase was not due to better rates on soft coal, because the bulk of the business was moved at very low rates under contracts made prior to the improvement in the coal trade. In fact, during last year, the rates on the company's tide-water bituminous coal business reached the lowest level in the history of the road. Better rates have been obtained since June 1, and with the existing conditions in the soft coal trade, and the conserving influence of the Pennsylvania's investment interests in the three soft coal-carrying roads, besides itself, the Baltimore & Ohio, the Chesapeake & Ohio and the Norfolk & Western, increased material prosperity of all the companies may be anticipated.

**Chicago, Milwaukee & St. Paul.**—The annual report of this company to June 30 has an interest above that of most of the annual statements. The company is not only one of the leading Chicago grain carrying lines, but its recent operations have been of an exceptional character, and the practical failure of the spring wheat crop gives a prospect of decreased earnings next year. Grain tonnage is not as important a proportion of the company's traffic as in earlier years, but the material reduction in the yield in the Northwestern States following last summer's hot, dry weather, is bound to have a material effect upon the company's revenues, despite the diversification of traffic. The extent of the loss in wheat tonnage may be gathered in part from the statement that in Minnesota, where the company has over 1,100 miles of road, the Government's crop report on Aug. 1 placed the average condition of wheat at 58 against 98 a year ago. In South Dakota, where it has also 1,100 miles, the condition is reported as 49 against 92 a year ago. In the last month or two there has been unusual irregularity in the course of the company's record of gross receipts, and since July 1 a decrease is reported.

Whatever loss there may be in tonnage through the decrease in the wheat movement is not likely to materially affect the company's net income, because this can be easily made up by decreased appropriations toward extraordinary improvement expenses. The officers have intimated that this policy will be followed. It is possible because in the past fiscal year the company has been carrying out extensive improvements through appropriations of earnings, instead of charging the cost to capital, as in previous years. This policy has caused exceptional changes in revenue for the past year or two. In 1900, for instance, with an increase in gross earnings of \$3,574,000, expenses increased by \$4,458,000, so that in net earnings there was a decrease of \$884,000. This was chiefly accounted for by improvement work represented by an increase of \$2,454,000 in maintenance of way; an appropriation of \$1,475,300 for new equipment, and an increase of \$375,000 in the charges to the renewal and improvement fund.

These increases, as may be assumed from their extent, are accounted for principally by extraordinary betterments. Practically, the company has made stated appropriations from gross earnings to a renewal and improvement fund, increasing that fund from \$2,803,000 on June 30, 1899, to \$5,150,000 in 1900. Against it there was charged during the year \$2,220,400, so that the unexpended balance on June 30, 1900, is \$2,060,900. This amount, therefore, will be available during the present year for improvements, even if the directors decide to suspend further appropriations of earnings to the fund, which is hardly likely. The expenditures in the past year, paid for out of this fund, embrace \$707,000 for track elevation at Chicago; \$291,000 for additional second, third and fourth tracks; and \$1,041,000 for reducing grades on the La Crosse Division and on the Chicago & Council Bluffs Division in Iowa. This was begun last year, and is now nearly completed. In addition \$180,618 was expended for the Escanaba dock improvement. It will be seen that all of these items represent additional property, and might legitimately be charged against the capital account; in fact, as lately as 1897, this was regularly done on the St. Paul, the 1897 report recording charges against capital for fencing, new stations, shop machinery, etc., in addition to the class of work mentioned above, though the improvements were on a much smaller scale than in the past year.

Besides, the improvements charged to the special renewal fund, much work has been charged to operating expenses, as indicated by the increase in the cost of maintenance of way noted above.

With extensive improvement in the physical condition of the property, there has been a marked progress in the economy of transportation. The average train load reached 205 tons last year, against 187 tons in 1899, 175 in 1898, and but 152 in 1895. The average ton-mile revenue decreased slightly, due to the larger pro-

portion of low grade freight, coal, ores, lumber, etc. The decrease was only from 9.37 mills to 9.30 mills, whereas in 1898 and 1897 the loss had been over 1-3 mill in each year. The freight train-mile revenue has increased materially, and at \$1.907, is at the top figure, comparing with \$1.748 in 1898, \$1.695 in 1897 and only \$1.57 in 1893.

In the September issue of the *North American Review*, Mr. Ingalls has an article on the Presidential campaign, in which he states the reasons why he, a democrat, will vote for McKinley. As coming from Mr. Ingalls, a gentleman who has successfully carried large responsibilities for many years and who has made for himself a distinguished position in the railroad world, the article is of especial interest to railroad men. Almost its only value, however, is in that it states Mr. Ingalls' position. As an example of exposition and argument, it is disappointing; evidently, it was written in haste. But Mr. Ingalls makes some very wise suggestions which are certain to have a good influence on voters and on those who help to make public opinion. "Now, as in 1896, the real issue is the silver danger. That is the peril threatening this country, not the imaginary evils attendant on the acquisition of new territory. . . . The coming test of the silver question at the polls must in all human probability be the final one." It is beyond belief that a majority of our people, or even a great minority can be diverted from this real issue and can vote to bring upon the nation the misfortunes and the dangers of a debased currency. Again, Mr. Ingalls says: "The statesmanship of our land might well develop its ripest fruits in the solution of our colonial problems. . . . We must institute wisely and honestly an American colonial system worthy alike of our new possessions and of their mother country." Here he goes directly to the center of the expansion question. Whatever may be the immediate results of our new enterprises beyond the sea, in money and lives spent, in dangerous international situations opened up, and in trade created or won, we may confidently expect ultimate profit in the breed of statesmen and soldiers developed in these enterprises. England's most fruitful nursery of great men has been her colonial system, and we may look for the same fruit from the same stock.

The Cotton Crop Supplement of *The Chronicle* for Sept. 8 has been issued showing the world's cotton movement for the year ended Sept. 1, 1900. The crop of the United States for the year is estimated at 9,439,559 bales, against 11,235,383 bales in 1899, and 11,180,960 bales in 1898. The exports this year were 6,042,246 bales, and the spinners' takings 3,792,618 bales. This leaves a balance of 88,032 bales of the new stock on Sept. 1. A year ago the stock was 392,280 bales. Of the spinners' takings this year, 1,599,947 bales were by the Southern mills and 2,192,671 by the Northern mills. There has been a similar falling off in the cotton production of other countries. The world's production this year, including the East Indies, Egypt, Brazil, etc., is 12,177,000 bales, against 14,798,621 bales in 1899, and 14,144,300 bales in 1898. The world's consumption this year is estimated at 13,859,768 bales, leaving a deficit of 1,682,768 bales. Last year there was a surplus of 801,105 bales and the year previous a surplus of 1,255,532 bales. The world's stock on Sept. 1 last was placed at 2,095,499 bales. Meanwhile there has been a gradual increase in the number of spindles from 97,000,000 in 1896, to 105,000,000 in 1900. Of these 18,500,000 are in the United States. Of course these figures were issued before the storm in Texas. If the loss of cotton reaches 250,000 bales, as some experts figure it, the depletion of stock in the face of the already scant supply warrants the jump in prices on the cotton exchanges immediately after the storm.

In a derailment on the Metropolitan District Railway, of London, recently reported by the Board of Trade, a device for automatically indicating the name of the next station figured as a possible cause. The derailment was due to the fracture of an axle. On the axle was a gun-metal sleeve and to this sleeve was attached a heavy lever connected with the indicator in the passenger car; when its lower end comes in contact with inclined planes or cams on the roadbed, this lever changes the indicator. A considerable blow is given to the axle each time the lever strikes a cam and this quite possibly "has some deleterious effect"; but the inspector goes no farther than to approve the opinion of a mechanical officer of the road, that the presence of sleeves on axles, as in this case, makes it necessary "to have a critical examination of the axles oftener than once in four years."

#### TECHNICAL.

##### Manufacturing and Business.

Ashcroft Manufacturing Co. have been awarded a medal at the Paris Exposition for locomotive steam gages.

The Bethlehem Steel Company received, Sept. 1, a telegraphic order for a port propeller-shaft to replace one which broken in Plant Line S. S. "La Grande Duchesse." The owners of the vessel specified that the shaft should be made of fluid-compressed open-hearth steel, forged under hydraulic pressure, annealed and rough-turned, and the order was booked for shipment Sept. 11. The shaft measured 32 ft. over all x 13 1/4 in. in diam., and the shipping weight was 15,458 lbs. It was shipped Sept. 6, five days in advance of requirements.

#### Iron and Steel.

The National Tube Co., Pittsburgh, Pa., on Sept. 5, announced an advance of 5 per cent. in prices on merchant and wrought iron pipe.

After an idleness of about 10 weeks, the Illinois Steel Company's plant, at Bay View, near Milwaukee, Wis., resumed operation Sept. 10.

The Cuban Central Railroad Co. is placing orders in this market for their requirements. Rolling stock, bridge material and considerable finished iron and steel are said to have been bought.

According to the *Madrid Gazette* the Arsenal of Ferrol wants bids for iron and steel which the arsenal will need up to June 30, 1901. The Minister of Marine will shortly announce the date on which bids are to be presented and give other details as to requirements. Probably American bidders would not have special favors.

#### The Emergency Brake Valve.

The Westinghouse Air Brake Co. has sent out the following circular concerning the exchange of old-style emergency valves for new: "Some time ago a change was made in the form of the emergency-valve stem which necessitated the use of a rubber seat having a 5/8-in. hole through the center instead of one 3/4-in. in diam. as previously: . . . The distinct advantage gained by the use of the latest and most improved form of emergency valves leads us to make the following proposition for the exchange of all earlier types: We will ship the present standard emergency valve complete at our regular list price of 60 cents each, f. o. b. works. We will accept in exchange an equal number of old-style emergency valves, delivered at our works, and credit at 40 cents each; the difference of 20 cents between charge and credit to be subject to the 15 per cent. rebate, making the net cost of the new-style emergency valves to our patrons only 17 cents each. This offer is prompted by the importance of having this part of our quick-action triple valve put and maintained in the best possible condition."

#### THE SCRAP HEAP.

##### Notes.

It is reported that the Great Northern has discontinued the use of the Union terminal station at Sioux City, Iowa, and will run its trains to the station of the Chicago, Milwaukee & St. Paul.

Statements are published in the newspapers to the effect that the Philadelphia & Reading will hereafter decline to issue passes to employees who have not worked for the company at least three years.

On Aug. 28 the Pittsburgh & Lake Erie moved an excursion train of 20 passenger cars from Pittsburgh to New Castle, with one locomotive, making fair time. The excursionists proved more numerous than had been expected and the train had to be enlarged at short notice. The reporter says that 1,900 persons were carried on this train.

The death of Mr. E. S. Washburn, President of the Kansas City, Fort Scott & Memphis, was recorded in the *Railroad Gazette* last week. On the day of his funeral all business, including train movements and all work of every kind, was suspended for five minutes, as a mark of respect. At 11:15 every train or locomotive and every piece of machinery was stopped, and remained idle until 11:20.

At Brighton, Colo., near Denver, on the morning of Aug. 28, 60 construction laborers of the Union Pacific riding to the city in a freight car were robbed by three masked men, who climbed down from the top of the car while the train was in motion. The laborers had just been paid off, and it is said that the robbers got from \$5 to \$20 from each man in the car. The robbers closed the doors while they were inside and did their work by a torchlight which they made with some turpentine.

One of the superintendents of the Southern Railway is said to have issued a circular to his employees, particularly trainmen, cautioning them not to indulge too much in political discussions. From the tenor of the circular, as printed in the newspapers, we judge that trainmen are in the habit of sitting up nights in their lobbies and round-houses to discuss political matters. The superintendent says that statistics show that during Presidential campaigns the percentage of accidents increases from July to November. As accidents generally increase from July to November in all years, it is not exactly easy to understand the force of this last point.

#### The August Traffic at the Soo.

Statistical report of lake commerce through canals at Sault Ste. Marie, Michigan and Ontario, for the month of August, has lately been published under direction of Lt. Col. G. J. Lydecker, Corps of Engineers, U. S. A., by Mr. Joseph Ripley, Assistant Engineer and General Superintendent. The total freight was 3,714,724 tons, of which 2,986,272 east-bound. The Canadian canal passed 7 per cent. of this total. The iron ore was 2,559,841 tons, the wheat 3,140,046 bushels, the grain 663,913 bushels, and the coal was 651,145 tons. The total vessel passages were 2,993, and their registered tonnage was 3,243,476.

#### Southern Railway at Paris.

The Southern Railway Co. has received, at Paris, two grand prizes and two silver medals. One of these grand prizes was given for the exhibit of Southern products in the United States Agriculture Department, and one for a forestry exhibit. The silver medals were given for photographic showings of various products of the South. Surely this was a most commendable enterprise on the part of the Southern, and it will probably stimulate immigration and investment in the South.



## LOCOMOTIVE BUILDING.

The *Tennessee Copper Co.* has ordered one engine from the Schenectady Locomotive Works.

The *Michigan Central* is having four engines built by the Schenectady Locomotive Works.

## CAR BUILDING.

F. M. Pease, Inc., Chicago, is building 10 tank cars for Joy Marton & Co.

The *Union Pacific* is reported as asking bids on 500 box and 500 stock cars.

The *Mexican Central* is asking prices on 100 coal cars of 80,000 lbs. capacity.

The *Wisconsin Central* is reported to be considering buying a lot of freight cars.

The *Delaware & Hudson* has ordered 500 coal cars from the American Car & Foundry Co.

The *Chicago & Northwestern* is reported to be considering an order for 3,500 freight cars.

The *St. Louis Southwestern* denies the report that it is in the market for additional equipment.

The *Cold Blast Transportation Co.* expects to order 300 or 400 refrigerator cars in the near future.

The *Armour Packing Co.* has ordered 700 refrigerator cars from the American Car & Foundry Co.

The *Snyder & Austin Lumber Co.* has ordered 15 flat cars from the American Car & Foundry Co.

The *Michigan, Indiana & Illinois Line* has ordered 15 tank cars from the American Car & Foundry Co.

The *Toledo, St. Louis & Western* is getting prices on 250 box and 50 furniture cars, but nothing definite has been decided.

The *Rodger Ballast Car Co.* has placed an order with the American Car & Foundry Co. for 40 of its 34-ft. 40-ton Rodger ballast cars. They will be equipped with airbrakes, vertical hook couplers and Common Sense body and truck bolsters and have a capacity for 36 cu. yds. of ballast. Delivery will be made in October.

The *Vandalia*, as noted Aug. 31, has ordered 100 coal cars from the American Car & Foundry Co. to be built at the Terre Haute Works. The cars will be of 80,000 lbs. capacity, 35 ft. 7 in. long, 8 ft. 11 in. wide and 7 ft. 10 1/2 in. high, from top of rail, and will have wooden underframing. The special equipment includes steel axles, cast-steel body and truck bolsters, National hollow brake-beams, Westinghouse quick-acting brakes, Janney couplers, Graham draft rigging, M. C. B. journal boxes with pressed steel lids for 5 x 9 in. journals, diamond trucks and cast-iron wheels, 33 in. in diam.

The *Colorado Midland*, as noted last week, has ordered 100 stock cars, with feeding attachments, from the Pullman Co., delivery to be made Oct. 10. The inside length will be 36 ft. 5 1/2 in. and the width, over side sills, 9 ft. 4 in. The cars will be of wood and will have wooden underframes. The special equipment includes Shickle, Harrison & Howard cast-steel bolsters and archbar trucks, Sterlingworth brake-beams, cast-iron brake-shoes, Westinghouse quick-action automatic brakes, Tower automatic couplers, American continuous draft rigging, McCord malleable iron journal boxes and lids, double-board pine roofs and cast-iron wheels.

The *Boston Elevated* has ordered 45 cars from the St. Louis Car Co., 22 from Osgood, Bradley & Sons, and 30 from the Wason Mfg. Co. These are for use on the elevated structure.

## BRIDGE BUILDING.

AMHERST, WIS.—The Wisconsin Central proposes to build a bridge over Waupaca River, and also a trestle over Main street in Amherst.

BANGOR, ME.—The committee on streets, highways and bridges is investigating the probable cost of a steel bridge at Franklin street.

BEECH CREEK, PA.—The Pennsylvania R. R. will build a bridge on a proposed branch from the Bald Eagle Road.

CAZENOVIA, N. Y.—Bids are wanted by the State Superintendent of Public Works, until Sept. 20, for a steel bridge over Cazenovia Lake outlet at Foreman street, as noted in our advertising columns.

CHICAGO, ILL.—The two lowest bids, opened Aug. 29, for building a bridge over the Chicago River at Canal street, were the American Bridge Co., \$139,943, and the Toledo Bridge Co., \$140,979.

Reports state that the Chicago Terminal Transfer Co. has reached an agreement with Mayor Harrison regarding the track elevation ordinance. The ordinance, as amended, requires the company to keep in repair its viaducts at Polk, Taylor, Halsted and Twelfth streets and at Blue Island avenue. The company also agrees to build a subway at Forty-seventh avenue.

Bids for building three bridges this year are reported advertised. They are to be at Clybourn place, North avenue and West Division street. Each bridge will cost about \$150,000 and are after designs made by Bridge Engineer Edward Willmann.

CINCINNATI, OHIO.—The Cleveland, Cincinnati, Chicago & St. Louis has recently placed orders with the Toledo Bridge Co. for about 200 tons of plate girder bridges.

CLEVELAND, OHIO.—The Cleveland & Pittsburgh will abolish seven grade crossings in Newburg. There are 25 crossings in Cleveland to be abolished, for which it is reported plans are being made.

COBRAM, N. S. W.—Bids are wanted by the New South Wales Government, up to Oct. 29, for a steel lift bridge over the River Murray at Cobram. Plans, specifications and form of bids may be secured from the Principal Assistant Engineer for Roads and Bridges, Sydney, or Department of Public Works, Melbourne.

COHOES, N. Y.—The United Traction Co. will build a bridge at this place next year. W. J. Elliot, City Clerk.

CRETE.—The Government of Crete is reported in the market for five bridges, varying from 40 meters to 150 meters in length. About 365 tons of iron and steel will be required. Our State Department could probably give the names of agents in the United States if there are such.

DAVENPORT, IOWA.—The Burlington, Cedar Rapids & Northern, and the Davenport, Rock Island & Northwestern railroads have offered to pay the city part of the cost of building a bridge from Mill street to City Island.

DETROIT, MICH.—Proposals are wanted at the office of the Commissioners of Parks & Boulevards, until Sept. 17, for a masonry bridge on Belle Isle Park. M. P. Harbut, Secretary and General Manager.

FREEDPORT, ILL.—The Board of Highway Commissioners have decided to build a new bridge at the foot of Stephenson street at a cost of about \$15,000. The county will pay part of the cost.

HONOLULU, H. I.—Bids are asked, until Oct. 1, for two steel highway bridges in Honolulu. Specifications may be seen at the office of Welch & Co., San Francisco, Cal.

JERSEY CITY, N. J.—The Board of Supervisors, at a recent meeting decided to repair the Clay street bridge at a cost of about \$8,000.

JOLIET, ILL.—The Chicago & Alton, according to report, has made an agreement with the Highway Commissioners to abolish the grade crossings in Joliet. A number of viaducts and subways will be built.

KANSAS CITY, MO.—The viaduct proposed by the Metropolitan Street Ry. Co., and mentioned in our Construction Supplement, will be on Summit street. The plans, which are now before the Board of Public Works, provide for a viaduct 731 ft. long and 48 ft. wide, with a 34-ft. roadway containing double tracks; also two 7-ft. sidewalks. The viaduct will begin at the intersection of Summit and Twenty-fourth streets and Southwest Boulevard, and run south on Summit to Twenty-fifth street, crossing the Belt Line Ry. tracks.

MILDEX, N. Y.—Bids are wanted, Sept. 20, by the State Superintendent of Public Works for a steel Warren truss bridge of 104 ft. span over the Erie Canal, opposite St. Johnsville, as noted in our advertising columns.

NEW ORLEANS, LA.—A bridge is reported proposed on Miro street over the Orleans Canal.

PHILADELPHIA, PA.—The plans are reported ready for the bridge over Market street to the Pennsylvania R. R. station.

PITTSBURGH, PA.—The Western Bridge Co. was incorporated, Sept. 4, by Charles D. Myers, G. B. Cooper, of Pittsburgh; J. F. Torrance, Rochester, Pa.; John A. Meade, and R. F. Ramsey, Treasurer, Allegheny.

ROCHESTER, N. Y.—The State Superintendent of Public Works wants bids, until Sept. 20, for a steel lift bridge over the Erie Canal at West avenue, as noted in our advertising columns.

ST. JOSEPH, MO.—Bids are asked, until Sept. 17, for 11 bridges and several culverts for Buchanan County. Theodore Steinaker, County Surveyor.

TOLEDO, OHIO.—The city, according to report, will build a steel viaduct over St. Clair street at a cost of about \$32,000.

TORONTO, ONT.—The city engineer has been asked to prepare estimates for the Dundas street bridge.

TOWNSEND, MONT.—The Commissioners of Broadwater County, according to report, contemplate building a combination bridge over the Missouri River, for which plans are reported being made. John H. Farmer, County Surveyor, Helena, Mont.

UTICA, N. Y.—Bids are wanted, Sept. 20, by the State Superintendent of Public Works for a steel lift bridge over Erie Canal at Washington street, as noted in our advertising columns.

WELLINGTON, KAN.—Bids are wanted, Oct. 3, at the office of W. E. Wood, County Clerk, for one 80-ft. steel span, 16-ft. roadway, on tubular iron piers, to be built over Slate Creek.

WEST NEWTON, MASS.—The Boston & Albany is working on the problem to eliminate the grade crossings on the Circuit Line in West Newton. The plans made in 1898 called for nine bridges, eight of which were overhead highway bridges and one a railroad bridge.

## Other Structures.

ALBUQUERQUE, N. MEX.—The Atchison, Topeka & Santa Fe machine and boiler shops will soon be increased to double their present size. The machine shops, when completed, will be 380 ft. long and will be of stone. Some machinery has been ordered.

BELLWOOD, PA.—The Bellwood Mfg. Co.'s plant at this place was destroyed by fire Sept. 6. The company has orders for castings for the Pressed Steel Car Co.

BIRMINGHAM, ALA.—The Birmingham Rail & Locomotive Co., according to report, will shortly build a plant to make corrugated iron roofing, ceiling, etc. It is the intention to have the plant in operation within three months.

DANIELSON, CONN.—Fire, on Sept. 5, destroyed the New York, New Haven & Hartford freight house and other property in Danielson.

INDIANAPOLIS, IND.—The Pittsburgh, Cincinnati, Chicago & St. Louis will build at once a brick freight station and office building at the corner of Delaware and Georgia streets, Indianapolis. The office building to be two stories high, 50 x 360 ft. The freight house will be one story high, 40 x 180 ft., the approximate cost being \$60,000.

NASHVILLE, TENN.—The new Union passenger station of the Louisville & Nashville, and the Nashville, Chattanooga & St. Louis, in Nashville, described and illustrated in the *Railroad Gazette*, Oct. 28, 1898, p. 774, was opened for train service Sept. 3.

PHILADELPHIA, PA.—The Fort Pitt Bridge Works, Canonsburg, Pa., has the contract for the large machine shop to be built for the Miles-Bement-Pond Co., in Philadelphia. It will be of brick and iron, 100 x 200 ft., one story high, and cost \$10,000.

PITTSBURGH, PA.—The American Steel & Wire Co. will begin work in November on three new furnaces on Neville Island. The plans have recently been finished by Julian Kennedy, of Pittsburgh. The furnaces will be built by the Ritter-Conley Mfg. Co., of Pittsburgh.

RACINE, WIS.—The Racine Iron & Steel Mfg. Co., recently incorporated for \$50,000, will erect a building 70 x 200 ft. at Lakeside, Wis., to form the main building for the plant.

TROY, N. Y.—The Boston & Maine contemplates making alterations in the property of the Fitchburg R. R. at Troy. Improvements in the freight facilities and in the Adams street dock are proposed. The company is also interested in the proposed new Troy union station, but this is in charge of the New York Central.

## MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xi.)

## American Society of Railroad Superintendents.

The thirtieth meeting of the American Society of Railroad Superintendents will be held in New York Oct. 18, 1900. C. A. Hammond, Secretary.

## The Engineers' Club of Philadelphia

A regular meeting of the club, the first fall meeting, will be held on Saturday, Sept. 15, 1900, at 8 o'clock p. m. The paper will be "The Water Jet as an Aid to Engineering Construction," by L. Y. Schermerhorn.

## Railroad Master Blacksmiths' Association.

We have mentioned the fact that the National Rail-

road Master Blacksmiths' Association meets at Detroit next week. Mr. H. F. J. Porter, of the Bethlehem Steel Co., will deliver an address before the association on the evening of Sept. 19 on the subject of "The Development of the Forge Men's Art."

## Municipal Electricians.

We have already noted the fact that the International Association of Municipal Electricians is to meet at Pittsburgh, Sept. 25, 26 and 27. The local committee is at work actively and a number of railroad men have recently been added to it, namely, C. E. McKim, Superintendent of Telegraph, Pennsylvania Company; J. R. Smith, G. H. Sheaffer, C. B. Gorsuch, division operators on the West Penn, the Pennsylvania and the Baltimore & Ohio. The committee is planning many pleasant and profitable excursions.

## Canadian Society of Civil Engineers.

The programme for the annual entertainment in Ottawa, from Sept. 13 to 16, included the following: Sept. 13, 4:30 p. m.—Excursion by the new electric railroad to Britannia Bay and the works of the Metropolitan Power Co., by the courtesy of the Ottawa Electric Ry. Co. and John Aylen, Esq., C. E.; 8:00 p. m., meeting of the society in the Council Chamber, City Hall. Sept. 14, 9:00 a. m.—Visit to the various industries at Chaudiere, including the following works: E. B. Eddy & Co., J. R. Booth's Lumber Mills, Benson & Co., Carbide Works, etc.; 11:30 a. m., inspect the construction of the Inter-Provincial bridge over the Ottawa River; 3 p. m., garden party by Thomas C. Keefe, C.E., C.M.G., at his home; 8:00 p. m., a conversation at the Victoria Hotel, Aylmer. By courtesy of the Canada Atlantic Ry. a special train will leave the Central Station at 8:00 a. m. Saturday to convey the members to Depot Harbor and Parry Sound, returning to Ottawa Sunday morning.

The Canadian Pacific, Grand Trunk, Intercolonial and Canada Atlantic Ry., will grant free return passages to members and their families who shall have paid one way first class fare going to the meeting, on presentation of a certificate signed by the ticket agent (from whom the certificate must be obtained) at the point of starting, and by the Secretary of the society.

## PERSONAL.

(For other personal mention see Elections and Appointments.)

—Mr. P. W. Corbett, Assistant Secretary of the Northern Pacific, died suddenly Aug. 31. He was born in Scotland in 1867.

—Mr. Timothy W. Hammond, for several years Treasurer of the Worcester, Nashua & Rochester, died at his home in Worcester, Mass., Aug. 22, aged 86.

—A rumor has gone the rounds of some of the daily newspapers to the effect that Mr. George W. Stevens, President of the Chesapeake & Ohio, had offered his resignation, or at least would soon do so. We have the best possible authority for saying that there is no truth in this rumor.

—Mr. Francis Edward Hinckley died in Westerleigh, West New Brighton, S. I., Sept. 6, of heart disease. He was born at Elmira, N. Y., in 1844, and entered railroad service in 1868 as Contractor, Superintendent and President of the Ogle & Carroll County. One year later he became Chief Engineer of the Chicago & Iowa, and in 1870 President of the same road. Mr. Hinckley has been President and Receiver on various roads, such as the Chicago, Pekin & Southwestern, Chicago & Paducah, and the St. Louis, Kansas City & Colorado.

—Mr. N. C. Draper, Superintendent of the Peoria & Pekin Terminal, was born in Boston in 1865. He attended the common schools of that city and was graduated from the Massachusetts Institute of Technology in 1886 as an electrical and mechanical engineer. He served as an engineer on the staff of the General Electric Co., supervising the installation of street railroad plans until 1890. Then he was Division Superintendent for the Chicago City Ry. until 1892, and Superintendent of Motive Power for the Central Ry. Co. of Peoria until 1898, when he accepted the position of Master Mechanic of his present company, the Peoria & Pekin Terminal. He acted as Superintendent of Construction while the road was building and was promoted to Superintendent on Aug. 15, 1900.

—Mr. M. M. Richey, Superintendent of Terminals of the Central R. R. of New Jersey, at Jersey City, N. J., was born in Indiana in 1855. He began his railroad work as a brakeman on the Pittsburgh, Cincinnati, Chicago & St. Louis in September, 1872. He served as brakeman, fireman, engineer and conductor to this company and the Cleveland, Columbus, Cincinnati & Indianapolis until 1880, when he was made General Yard Master on the Lake Erie & Western. In 1890 he took a similar position at Chicago with the Chicago, Lake Shore & Eastern, and continued with that company until 1899 as Superintendent from 1891, and as General Superintendent from 1894. He was appointed Trainmaster of the Central of New Jersey in November, 1899, and to his present position of Superintendent of Terminals in August, 1900.

—Mr. C. F. Franklin, General Superintendent of the Toledo, St. Louis & Western, which is the successor company to the Toledo, St. Louis & Kansas City, was born Aug. 29, 1858. He began his railroad service with the Delaware, Lackawanna & Western at Hoboken, N. J., in 1873 as a messenger boy in the baggage room. After continuing with that company in minor positions until 1875, he entered the service of the Long Island as joint baggage master and express messenger on the North Shore Division. He served from 1880 to 1890 as passenger and freight conductor, when he was appointed Station Master and assistant to the Trainmaster at Long Island City. In 1894 he went to the Newburg & Walden as General Superintendent, and in 1898 accepted the position of Superintendent of the Ohio Southern. His present appointment as General Superintendent of the Toledo, St. Louis & Western was made July 1.

—Mr. Harry B. Chamberlain, Eastern Freight Traffic Manager of the Erie, at New York City, was born at Buffalo, N. Y., Aug. 1, 1859. He entered railroad service in 1875 with the New York Central & Hudson River and continued with that company until 1880, when he was made chief clerk of the local freight office at St. Louis, Mo., of the St. Louis, Iron Mountain & Southern. For three years following 1882 he was with the Commercial Express Fast Freight Line, and then until 1890, Claim Agent of the New York, Lake Erie & Western. He was then appointed Assistant General Freight Agent of the same company, and from 1891 to 1893 served as General Manager of the Erie Dispatch Fast Freight Line. From February, 1893, until May, 1898, he was General Freight Agent for the New York, Lake Erie & Western and the Erie, and until August last Assistant Freight Traffic Manager of the Erie lines east of Buffalo and Salamanca, and the Union Steamboat Line. His recent appointment took



effect Aug. 20. In addition to his duties of Eastern Freight Traffic Manager of the Erie, he holds a similar position with the Union Steamboat Co., and the New York, Susquehanna & Western.

### ELECTIONS AND APPOINTMENTS.

**Atlantic Coast Line.**—J. W. Oplinger has been appointed Master Mechanic of the South Rocky Mount Shops, succeeding F. P. Hickey, transferred. H. Swoyer becomes Master Mechanic of the Florence Shops, succeeding D. J. Justice, who, in turn, becomes General Inspector, succeeding O. A. Alexander, resigned, effective Sept. 1.

**Birmingham & Atlantic.**—John C. Soley has been appointed General Manager.

**Boston & Albany.**—J. M. Graham has been appointed Master Mechanic, with headquarters at Rensselaer, N. Y., succeeding E. Priest.

**Boston & Maine.**—P. M. Hammett has been appointed Assistant Superintendent Motive Power.

**Brainerd & Northern Minnesota.**—C. A. Clark has been elected Treasurer, succeeding E. L. Carpenter.

**Butte, Anaconda & Pacific.**—A. J. McCabe, General Superintendent at Anaconda, Mont., has resigned and the position has been abolished.

**Chicago Great Western.**—Secretary R. C. Wight has been elected a Director, succeeding C. W. Benson. F. R. Coates has been appointed Chief Engineer, succeeding H. Fernstrom, resigned. Effective Oct. 15.

**Chicago, Milwaukee & St. Paul.**—F. W. Cox, General Foreman locomotive department at West Milwaukee, Wis., has resigned.

**Emporia & Gulf.**—A. T. Wansbrough, heretofore Traffic Manager and Assistant General Superintendent of the Warren & Corsicana Pacific, has been appointed General Freight and Passenger Agent of the E. & G., a company recently organized.

**Fort Worth & Denver City.**—E. F. Vincent has been appointed Resident Engineer, with headquarters at Fort Worth, Tex.

**Indiana, Illinois & Iowa.**—D. Nowlan has been appointed Acting Engineer Maintenance of Way, succeeding F. H. Mudge, resigned, effective Sept. 1.

**Iowa Central.**—H. J. Morse has been elected a Director, succeeding G. E. Taintor.

**Lehigh Valley.**—J. H. Filides has been appointed General Foreman, with headquarters at South Easton, Pa.

**Missouri Pacific.**—S. T. Shankland, Superintendent at Ossawatimie, Kan., has resigned, effective Oct. 1.

**Northern Pacific.**—Richard H. Relf has been appointed Assistant Secretary, succeeding P. W. Corbett, deceased.

**Old River & Kissatchie.**—The officers of this company are: President, J. C. Rives; Vice-President, John Brogan, and Secretary and Treasurer, F. J. Williams; all with offices at Montrose, La. D. W. Ingersoll is Commercial Agent at Dallas, Tex.

**Oregon R. R. & Navigation.**—On Sept. 6, E. S. Benson was elected a Director, succeeding W. McIntosh.

**Pennsylvania.**—W. B. Page has been appointed Master Mechanic of the Lambertville Shops, with headquarters at Lambertville, N. J., succeeding J. L. Mohun.

**Pittsburgh, Binghamton & Eastern.**—The officers of this company, referred to in the News column, are: President, F. A. Sawyer; Vice-President, Chas. L. Tracy; Secretary, B. Kuykendall, Jr.; Chief Engineer, R. P. McCormick. The principal office is at Towanda, Pa.

**Port Angeles Eastern.**—The officers of this company are: President, C. A. Cushing; Vice-President and General Manager, L. Pope; Second Vice-President and Assistant Manager, D. W. Craig; Secretary and General Passenger Agent, A. Shute; Treasurer, F. H. Carlisle; Assistant Treasurer, W. B. Hamblin; and Auditor, C. E. Cushing. (See Construction Supplement, July 27, 1900.)

**Randsburg.**—E. H. Stagg, Auditor and General Freight and Passenger Agent at Johannesburg, Cal., has also assumed the duties of General Manager, succeeding W. R. Woodard, resigned, effective Sept. 1.

**St. Joseph & Grand Island.**—H. Fernstrom, heretofore Chief Engineer of the Chicago Great Western, has been appointed Chief Engineer of the S. J. & G. I., succeeding G. P. Smith, resigned. (Aug. 17, p. 559.)

**St. Louis & San Francisco.**—The jurisdiction of A. J. Davidson, General Superintendent, has been extended over the track, bridges, building and water departments.

**Seaboard Air Line.**—On Sept. 1 the following Division Engineers were appointed: R. B. Seymour, First Division, with headquarters at Richmond, Va.; Samuel Lawrence, Second Division, at Hamlet, N. C.; R. Irvin Scott, Third Division, at Atlanta, Ga.; J. E. M. Hancel, Fourth Division, at Savannah, Ga.; Blair Burwell, Fifth Division, at Jacksonville, Fla.; and Philip Aylott, became Bridge Engineer, with headquarters at Portsmouth, Va.

**Southern Pacific.**—At a meeting of the stockholders, held Sept. 6, James Speyer was elected a Director, succeeding the late C. P. Huntington.

**Texas Midland.**—I. S. Willard has been appointed Auditor, succeeding J. B. Bartt.

**Waycross Air Line.**—W. G. Raoul, President of the Mexican National, was, on Aug. 30, elected President of the W. A. L., succeeding J. E. Wadley.

### RAILROAD CONSTRUCTION.

#### New Incorporations, Surveys, Etc.

**ARCADIA & CLIFTON HEIGHTS.**—This company was incorporated in Pennsylvania, Sept. 7, with a capital stock of \$25,000, to build a railroad 2½ miles long in Delaware County.

**BIRMINGHAM, ALABAMA & GEORGIA.**—This company was incorporated in Alabama Sept. 1, with a capital stock of \$20,000,000, to extend the East & West R. R. of Alabama from Pell City west about 30 miles into Birmingham. It is stated that the Birmingham Belt is to form the entrance into the city, and that the Tredegar Mineral and the Birmingham & Atlantic are to be included in the new company. The principal office is at Birmingham. The Manhattan Construction Co. is said to have the general contract. C. H. Hudson is President; Edward Kelly and E. P. Miller, Vice-Presidents; I. C. Beatty, Secretary; and J. B. Cobbs, Treasurer. (Construction Supplement, July 27, 1900.)

**CALIFORNIA NORTHWESTERN.**—The company has decided to build its extension from Ukiah, Cal., northwest 60 miles to the coast. Muir Bros. have taken the contract for the first 10 miles between Ukiah and Willets, and building is reported begun. Four different surveys

have been made. (Construction Supplement, July 27, 1900.)

**CHARLOTTE COUNTY.**—This company has been reorganized and a committee appointed to solicit subscriptions to stock. The line is projected in Virginia from a point on the Southern in Charlotte County, to run northwest to Smithville, and thence north to a point on the Norfolk & Western in Prince Edward County. D. P. Eggleston, of Smithville, is President, and F. C. Thornton, Secretary. (Construction Supplement, July 27, 1900.)

**CHATTahoochee VALLEY.**—The company has issued \$100,000 in bonds for its proposed extension from West Point, Ga., north up the Chattahoochee Valley. (Construction Supplement, July 27, 1900.)

**CHICAGO & NORTHWESTERN.**—Surveys are reported under way for double-tracking the line between Appleton, Wis., and Milwaukee.

**CHICAGO TRANSFER & CLEARING COMPANY.**—Building is begun on the proposed new yards near Summit, Ill., which are to cost about \$10,000,000. D. D. Streeter & Co. have the contract. The office of the Chief Engineer is at the Ellsworth Bldg., Chicago.

**CHICAGO, WEATHERFORD & BRAZOS VALLEY.**—The Texas State Railroad Commissioners have authorized the company to issue \$644,329 in bonds on 35.62 miles to be built from Bridgeport south to Waterford. The road as projected is to run south 153 miles via Waterford, Granby, Glen Rose, Walnut, Meridan, Clifton and Valley Mills to Waco. The Waterford Construction Co., of Waterford, Tex., has the general contract. R. F. Weitzell, of Waterford, is Chief Engineer; Col. N. W. Buster, Mayor of Waterford, is interested. (Construction Supplement, July 27, 1900.)

**CUBAN CENTRAL.**—E. H. Pearson, General Manager, at Sagua la Grande, Cuba, writes that his company is not at present contemplating building any extension of its line. (Aug. 17, p. 530.)

**DULUTH, ST. CLOUD, GLENCOE & MANKATO.**—Surveys are reported completed and contracts are to be awarded soon for this proposed line from Duluth, Minn., southwest about 200 miles, to St. Cloud, and thence south 175 miles to Mankato. A. H. Reed, of Glencoe, Minn., is President. (Construction Supplement, July 27, 1900.)

**EMPORIA & GULF.**—Organization is completed for this Texas line, which is projected from Emporia to a point on the Texas & New Orleans extension of the Southern Pacific, about 25 miles. According to press reports, 15 miles of the line is completed. S. F. Carter is President and Treasurer; T. P. Carter, General Manager; and L. Davidson, Traffic Manager. The central office is Emporia. (Aug. 31, p. 588.)

**GRAND TRUNK.**—With reference to the improvement at Port Credit, Ont., an officer writes that the bridge will be lifted several feet and the track raised so as to improve the gradients on either side of the river. The work is in progress and is expected to be finished in a short time. (Sept. 7, p. 602.)

**HILGARD, GRANITE & SOUTHWESTERN.**—Robert Smith, Manager of the Grande Ronde Lumber Co., and President of the railroad company, has returned to La Grande, Ore., from the East and announces that arrangements are completed for building the line. It is projected from Hilgard, Ore., on the Oregon Railroad & Navigation line, to run south 60 miles through Granite. (Construction Supplement, July 27, 1900.)

**HOLLY RIVER & ADDISON.**—Surveys are reported made for a further extension of this line from Diana, W. Va., to Addison, 12 miles. (Construction Supplement, July 27, 1900.)

**KANSAS CITY, FORT SCOTT & MEMPHIS.**—According to Alabama press reports, the Kansas City, Memphis & Birmingham will build a seven-mile branch in Walker County, Ala., to tap new mines being opened by the Empire Coal & Coke Co.

**KANSAS CITY, MEXICO & ORIENT.**—Contracts are reported awarded for building 400 miles of this line from Kansas City, Mo., southwest through Oklahoma Territory, Texas and Mexico to Topolobampo or Port Stillwell, on the Pacific coast. It is stated that work is to be begun at Port Stillwell and completed as far as El Fuerte, about 65 miles. The new Chihuahua & Pacific, from Chihuahua, Mex., west 124 miles to Guerrero, is to form part of the line. A. E. Stillwell is President and C. M. Atkinson, Secretary, both of Kansas City, Mo. The New York office is 150 Nassau street. (Construction Supplement, July 27, 1900.)

**KENTUCKY ROADS.**—Lawrence Rice, at Pineville, is reported making surveys for a line from Harlan west about 35 miles to Pineville or Middlesboro, on the Louisville & Nashville. The road is to tap timber and coal lands in Harlan County.

**LOUISVILLE & NASHVILLE.**—Grading is begun on the extension from Hanceville, Ala., to the mineral lands of the Stout Mountain Coal & Coke Co. C. D. Hutton & Co., of Mobile, have the contract. (Aug. 3, p. 531.)

**METROPOLITAN WEST SIDE ELEVATED.**—Condemnation proceedings have been begun in the Circuit Court at Chicago for an extension of the Douglas Park branch of this line from the present terminus at Twenty-eighth street and Western avenue to Albany avenue.

**MEXICAN ROADS.**—The Department of Communications has granted a concession to Henkel & Bros. for a railroad from Tenango, southern terminus of the Toluca & Tenango, to run southeast to Santa Maria or Tenancingo, with privilege of extension in the State of Morelos to the Mexico, Cuernavaca & Pacific, at or near the town of Anacuasac, in all about 40 miles. Six kilometers must be completed the first year and an equal amount in each subsequent year, the entire line to Santa Maria to be finished in four years.

**MISCELLANEOUS COMPANIES.**—The National Railway Construction Co., of Jersey City, was incorporated in New Jersey, Sept. 6, with a capital stock of \$50,000, to build and operate railroads. The incorporators are: L. B. Dailey, E. J. Dudley and K. K. McLaren.

**OREGON RAILROAD & NAVIGATION.**—Miller & Welch have the contract for building a spur five miles long from Wardner, Idaho, to the site of the concentrator of the Empire State, Idaho Mining & Development Co. The maximum grade is said to be 4 per cent.

**PENNSYLVANIA.**—Surveys are reported in progress for the proposed branch line at Beech Creek to the new works of the Pennsylvania Fire Brick Co.

**PEOPLE'S RAILWAY.**—This company has been organized at Pana, Ill., to build a railroad from Mount Zion, Ill., south 16 miles to a point near Yantisville, and thence through Shelbyville to Pana. Vernon Cutler is President.

**PHILADELPHIA & READING.**—The company is building four new sidings, each a mile long, between Bound Brook, N. J., and Trenton Junction, at Ewing, Glenmore, Skillman and Hamilton.

**PITTSBURGH, BINGHAMTON & EASTERN.**—See Railroad News column.

**QUEBEC & NEW BRUNSWICK.**—Organization is completed for this line from Connor Station, on the St. Fran-

cis branch of the Temiscouata Ry. in New Brunswick, to run to a point on the Intercolonial at or near St. Charles Junction, or to a point on the Quebec Central at or near St. Anselme, or to a point on the Grand Trunk at or near Chaudiere Junction, 130 miles. The Canadian Government has granted a subsidy of \$3,200 per mile. Hon. John Costigan, St. John, N. B., is President of the provisional board.

**SOUTHERN.**—J. C. Munday & Co., of Knoxville, have the contract for the stone work on the extension from Maryville, Tenn., southeast about nine miles to Gamble's store. Building is in progress. (Aug. 17, p. 560.)

**TOLUCA, MARQUETTE & NORTHERN.**—This company was incorporated in Illinois, Sept. 8, with capital stock of \$100,000, to build a line from Toluca, Marshall County, north through the counties of Marshall, Putnam and Bureau to Marquette in Bureau County, with branches east, north and west to the county boundaries. The directors are: Charles J. Devlin, Spring Valley, Ill.; E. Anderson, Marquette, Ill.; J. W. Thornton, Magnolia, Ill.; Henry Dugan, James E. Porterfield and William Tweist, of Toluca, Ill.; J. S. Wylie and Wm. A. Stephens, of Davenport, Iowa, and D. M. Wood, of Toluca, Ill.

**URBANA, MECHANICSBURG & COLUMBUS.**—Preliminary surveys are reported completed for this electric line from Urbana, Ohio, east about 40 miles, via Mechanicsburg, Plain City and Dublin to Columbus. The company was incorporated April 17, with a capital stock of \$100,000. Among those interested are H. A. Axline, Columbus; Colin McDonald and G. W. Hitt, Urbana; W. B. Marvin and D. J. Burnham, Mechanicsburg.

### GENERAL RAILROAD NEWS.

**ASHLAND & WORCESTER.**—H. B. Camp, President of this company, is said to have sold the uncompleted eastern end of his line from Apple Creek, Ohio, to Justus. The line now runs from the Ashland & Worcester Junction, near Shreve, to Ashland, 25 miles, and from Apple Creek to West Lebanon, 10 miles. (Construction Supplement, July 27, 1900.)

**CHICAGO, BURLINGTON & QUINCY.**—At the annual meeting at Chicago, Nov. 7, the stockholders will be asked to act upon the further consolidation of the railroads of the company in the states of Iowa and Missouri.

**CHOCTAW, OKLAHOMA & GULF.**—The stockholders, on Sept. 15, will vote on a motion to lease the White & Black River Valley, which runs from Brinkley, Ark., to Jacksonport, 58 miles, and from Wiville to Gregory, six miles. The W. & B. R. V. stockholders have already ratified the lease. (W. & B. R. V., July 13, p. 488.)

**DETROIT & LIMA NORTHERN.**—The sale of this property, set for Aug. 31, has been postponed until Sept. 21, on account of an error in the advertisement. (July 20, p. 502.)

**EUREKA & KLAMATH RIVER.**—The property of this railroad and of the John Vance Mill & Lumber Co., at Eureka, Cal., is reported sold to A. B. Hammond, of Missoula, Mont. The railroad is projected to run from Eureka to the Klamath River, 70 miles, of which 30 miles is completed. (Construction Supplement, July 27, 1900.)

**EVERETT & MONTE CRISTO.**—At sheriff's sale, at Everett, Wash., Aug. 18, this property was sold for \$100,000 to a representative of the bondholders' committee. See Monte Cristo below. (Feb. 9, p. 96.)

**KANSAS CITY SUBURBAN BELT.**—Judge John F. Phillips, in the U. S. Circuit Court, at Kansas City, on Sept. 6, appointed Stuart R. Knott President of the Kansas City Southern, and Edward F. Swinney, President of the First National Bank, Kansas City, as receivers for this property, the Union Terminal and the Kansas City & Independence Air Line. The Kansas City Southern owns nearly all the bonds of these companies, and the receivership is preliminary to getting a clear title.

**LOUISVILLE, EVANSVILLE & ST. LOUIS.**—The committee representing the \$670,000 of second mortgage bonds have effected a settlement with the reorganization committee which removes the danger of delay in selling the property under foreclosure. It is said that the sale will take place some time in October. (Aug. 24, p. 574.)

**MONTE CRISTO.**—This company has been incorporated at Olympia, Wash., with a capital stock of \$2,000,000, to take over the property of the Everett & Monte Cristo recently sold.

**NORFOLK & ATLANTIC TERMINAL.**—The Tennis Construction Co., at Norfolk, Va., on Aug. 24, filed a mechanic's lien for \$190,395 against the Sanford & Brooks Co., of Baltimore, and the N. & A. T. Co., for work done and materials furnished in building this electric line from Norfolk to Sewell's Point.

**PANAMA.**—First mortgage 4½ per cent. bonds to the par value of \$127,000 have been drawn for payment at the Central Trust Co., New York, Oct. 1, at 105. (Aug. 10, p. 546.)

**PENNSYLVANIA COMPANY.**—Sealed proposals will be received, Oct. 1, at not to exceed par and accrued interest for Cincinnati & Muskingum Valley first mortgage bonds up to \$15,000, and for Toledo, Walwhonding Valley & Ohio first mortgage bonds up to \$24,780 for the sinking funds.

**PITTSBURGH, BINGHAMTON & EASTERN.**—Under this title, on Aug. 25, were consolidated the properties of the P. B. & E., between Towanda and Binghamton, N. Y., the Bradford Central between Towanda and Canton, and the Canton & Wellsburg between Canton and Ansonia, Pa. The proposed line will extend from Ansonia, Pa., to Binghamton, N. Y., 115 miles. The principal office is at Towanda. Surveys and right of way are nearly completed and building is to be begun this fall. The officers are given under Elections and Appointments. (April 24, p. 574.)

**SANTA FE & GRAND CANYON.**—Judge Sloan, at Albuquerque, N. Mex., on Aug. 29, appointed E. D. Gage, of Prescott, receiver of this line, which has been completed from Williams, Ariz., 54 miles toward the Grand Canyon of the Colorado. (Aug. 17, p. 560.)

**SOUTHERN.**—The Central Trust Co., New York, notifies holders of Richmond & Danville equipment 5 per cent. mortgage bonds of Sept. 3, 1889, that \$54,584.75 has been set aside to pay for these bonds at a rate not to exceed par and accrued interest. Sealed proposals will be received up to noon, Sept. 26. (July 13, p. 488.)

**UNION PACIFIC.**—The Salina & Southwestern and the Solomon Valley were sold under foreclosure Sept. 4 for \$400,000 each to representatives of the Union Pacific. The sale was under the decree of Judge Sanborn of the U. S. Circuit Court at Leavenworth, Kan., on July 29. These roads were operated as part of the old U. P. system. (July 27, p. 518.)

**VELASCO TERMINAL.**—The sale of this property, which was to take place at Angleton, Tex., Sept. 4, has been postponed. (Aug. 31, p. 588.)